FOOD ENGINEERING

June 1954

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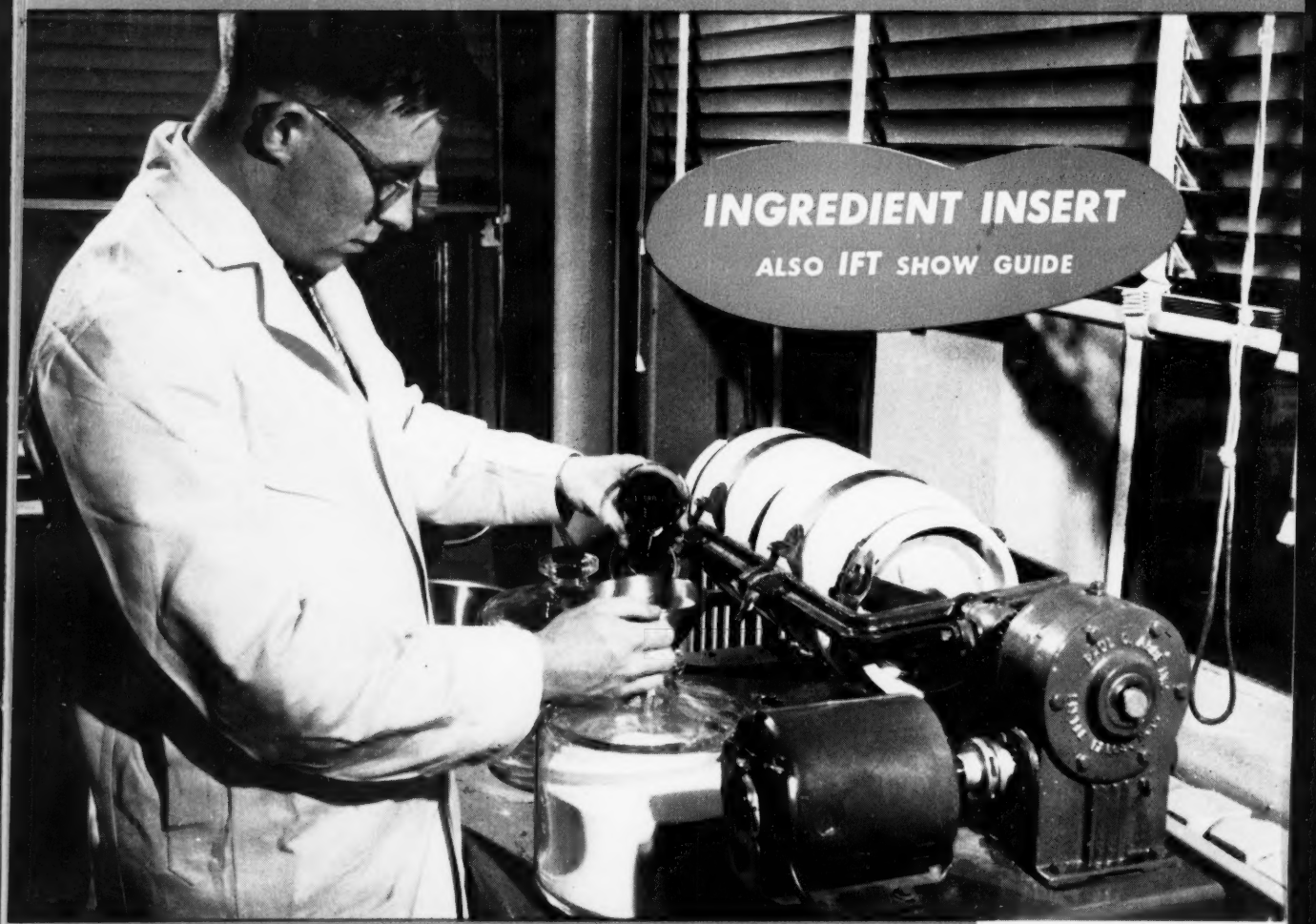
35 CENTS



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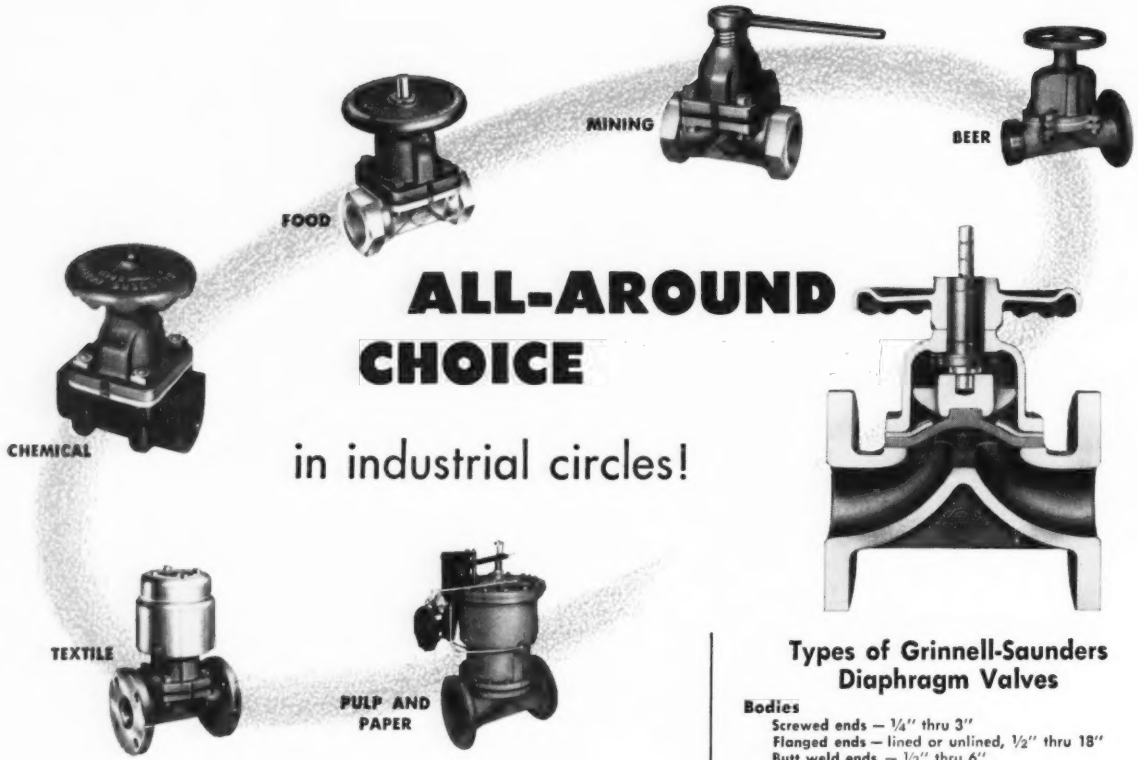

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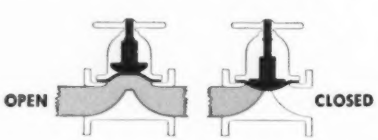

Types of Grinnell-Saunders Diaphragm Valves

Bodies
- Screwed ends — ¼" thru 3"
- Flanged ends — lined or unlined, ½" thru 18"
- Butt weld ends — ½" thru 6"
- Socket ends — ½" thru 4"

Angle Bodies
- Screwed ends — ¼", ⅜", ½", ¾", 1¼", 2"
- Flanged ends — ¾" thru 6".

Bonnets
- Handwheel operated bonnet (available with rising stem, travel stops, extended stem, chainwheel, adapted for Tejax indicator)
- Quick turn — lever operated bonnet, ½" thru 3"
- Bendix-Westinghouse topworks
  - **standard** (air to close — spring to open)
    - Robotair, ¼" thru 1"
    - Rotochamber, 1" thru 4"; in tandem, 5", 6"
  - **direct acting** (spring to close — air to open)
    - Robotair, ¼" thru 1"
    - Rotochamber, 1" thru 4"
  - **double acting** (air to close — air to open)
    - Robotair, ¼" thru 1"
    - Rotochamber, 1" thru 4"
- Piston operated, 6" thru 12"
- Sliding stem bonnet, ½" thru 12"

Diaphragms
- Natural rubber, neoprene, reinforced neoprene for vacuum, hycar, butyl, white gum rubber, Kel-F, Teflon, polyethylene.

Body Materials
- Iron, bronze, stainless steel, cast steel, aluminum, monel, saran, durimet

Body Linings
- Glass, lead, soft rubber, hard rubber, neoprene, saran

Bronze Beer Valves
- Socket both ends
- Socket end to flange end
- Flange both ends
- Socket end to male hose thread end
- Flange end to male hose thread end
- Male hose thread both ends

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Food Engineering

Vol. 26 • JUNE, 1954 • No. 6

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FOOD ENGINEERING
(Formerly Food Industries)
June 1954 Vol. 26, No. 6
Member ABC and ABP

Published Monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office 99-129 N. Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President & Treasurer; John J. Cooke, Secretary; Paul Montgomery, Executive Vice-President, Publications Div.; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President & Director of Advertising; J. E. Blackburn, Jr., Vice-President & Director of Circulation.

Subscriptions: Address correspondence to Food Engineering—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from the executives, engineers, and technologists in food processing plants. Position and company connection must be indicated on subscription orders.

Single copies 35¢. Subscription rates—U. S. and possessions $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Canada, $3 for 1 yr., $4 for 2 yr., $5 for 3 yr. Other Western Hemisphere countries $10 for 1 yr., $16 for 2 yr., $20 for 3 yr. All other countries, $15 for 1 yr., $25 for 2 yr., $30 for 3 yr. Entered as 2nd class matter Aug. 26, 1948, at Post Office at Albany, N. Y. under Act of Mar. 3, 1879. Printed in U.S.A. Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved.

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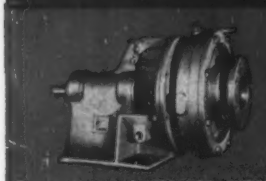
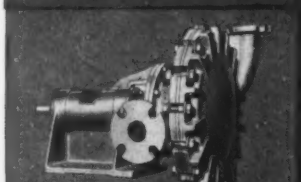
Find the Best Pump for Your Process Job Here—

	TYPE	APPLICATION	SIZE RANGE	SPECIAL FEATURES
 Frame Mounted: 5286351, 5286105 Close-coupled: 5286083, 5286140	**5SB** Single suction Frame mounted Grease lubricated Also available close-coupled	General purpose use	Heads to 550 feet. Capacities to 3500 gpm. Temperatures to 250 F.	Available in many materials. Choice of packing, single or double mechanical seal. Bearings protected from corrosive or abrasive atmosphere.
5287638, 5286105 (Multi-stage)	**5SB** Single suction Frame mounted Oil lubricated	Chemical, petroleum and general purpose use in medium high temperature range	Heads to 550 feet. Capacities to 3500 gpm. Temperatures to 550 F.	Available in many materials. Choice of packing, single or double mechanical seal. Stuffing box cooled above 250 F.
5287775	**Refinery Type R** Single suction Frame mounted Oil lubricated	Volatile liquids and high temperature process applications requiring heavy duty refinery type pump	Heads to 600 feet. Capacities to 1300 gpm. Temperature to 800 F.	Available in many materials. Choice of packing, single or double seals. Stuffing box, bearings, and pedestal may be water cooled.
 5286615	**P and PD** Single suction Frame mounted Grease lubricated	Handling fine abrasives in suspension or corrosive liquids	Heads to 260 feet. Capacities to 1300 gpm. Temperatures to 250 F.	Stuffing box on suction side. Choose packing, mechanical seal or *Equiseal* stuffing box — stops leakage to 15 feet suction head. Open or closed impeller.
5287112 (PW) 5286381 (CW)	**PW — CW** Single suction Frame mounted Grease lubricated	Handling slurries and pulps which combine corrosive liquid with suspended solids	Heads to 270 feet. Capacities to 10,000 gpm. Temperatures to 250 F.	Available in many materials. Choice of packing or mechanical seal. Easy to disassemble for inspection or repair.

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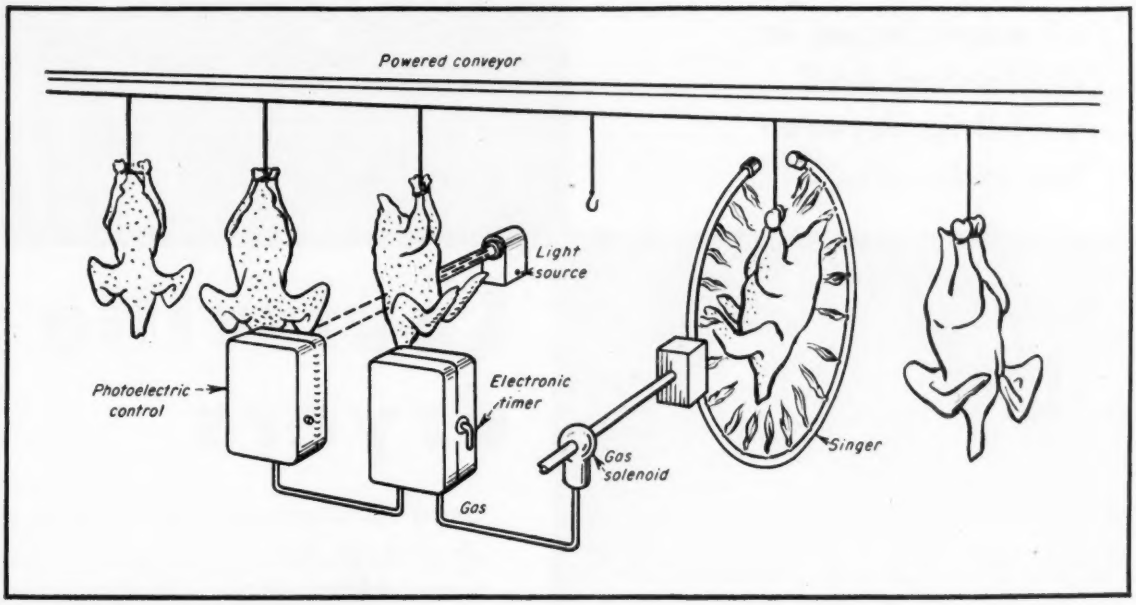
PRACTICAL IDEAS



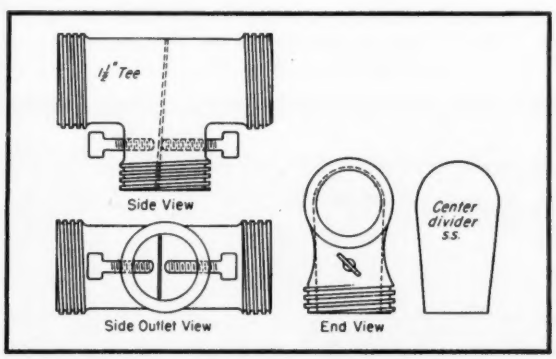
Carcass Singeing Controlled

Considerable gas may be wasted singeing poultry or hog carcasses when the singeing flame burns continuously even though carcasses pass uninterrupted through the singer.

Savings in gas consumption can be effected if the gas is extinguished except when a carcass is in the flame area.

Breaking of a photoelectric beam (see sketch) by a carcass opens the gas supply solenoid valve, and the singeing flame is ignited by a small continuous pilot flame. Restoration of the light beam upon passage of the bird or animal shuts off the gas after sufficient time (regulated by an electronic timer) has elapsed for the carcass to completely clear the flame, provided that during this delay no other carcass has broken the control beam.

When space permits, the timer can be eliminated by projecting the photoelectric control beam diagonally to the carcass' travel.—*Photoswitch, Inc., Cambridge, Mass.*

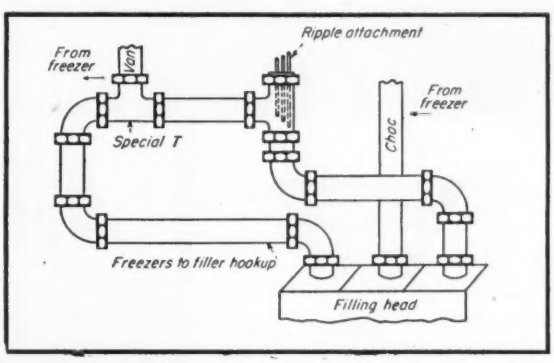


Three-Flavor Ice Cream Package

By employing a special "T" fitting (see left sketch) with recommended hook-up (right sketch) it is possible to regulate the flow of ice cream from two continuous ice cream freezers so as to supply three flavors to a package.

In addition to freezer pumps it is necessary to employ a positive pump in conjunction with the hook-up, in order to produce one of the three flavors. As an example, assume one freezer is operated at half capacity on chocolate ice cream and that the other freezer is operated at full capacity on vanilla ice cream. The flow of vanilla ice cream is separated into two strains in the special "T". In order to inject ripple syrup into one of the divided vanilla stream flows, the additional positive pump is employed.

The divider section of the "T" is adjusted by the outside stainless steel positioning bolts in the "T" to compensate



for this additional syrup flow so that the three flavors from the filling head discharge in exactly the same amount.

After the "T" divider is once set for any particular operation it is seldom necessary to change it.

The divider "T"—(A) in left sketch—is simply made by cutting halfway through the back of a standard stainless steel sanitary "T" with a hacksaw. Then inserted is a thin piece of stainless steel (B). Width of the divider is constructed the same as the inside opening of the "T". Divider plate is then soldered and dressed to a smooth finish. Holes for adjusting-bolts are drilled at ⅛ in. and tapped with ¼ in. standard thread.

Since every part of the unit is accessible for washing and sterilizing, the "T" fitting is sanitary. Its use is not limited to the preparation of three-flavored packages. A two-flavor package can be made using the "T" and one continuous freezer.—*C. C. Davis, Lexington, Ky.*

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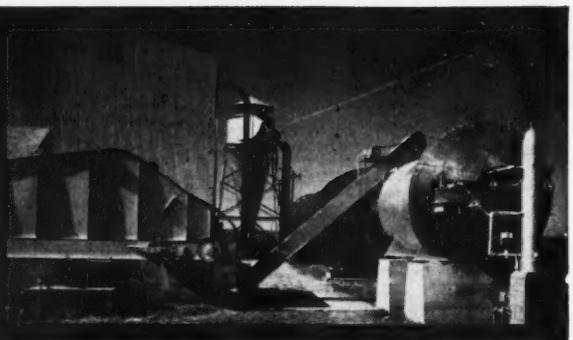

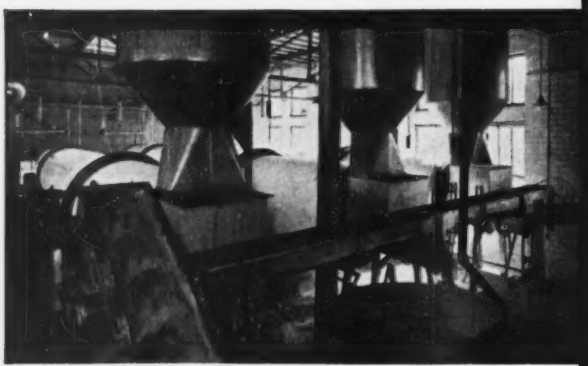

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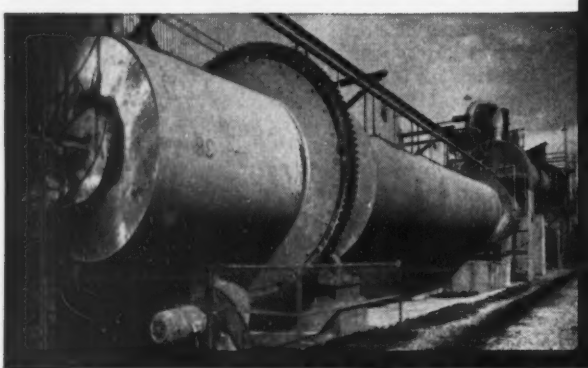

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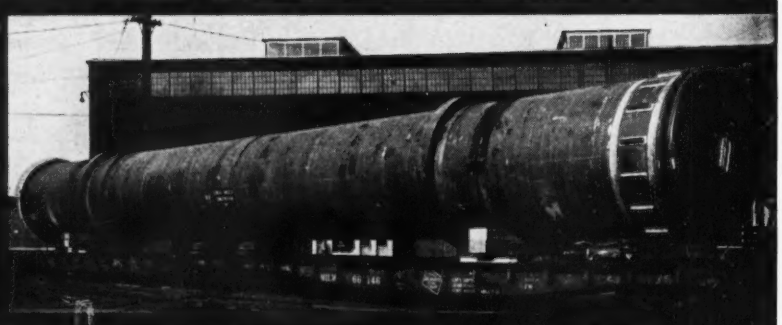

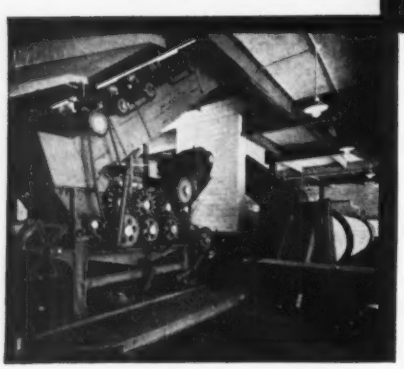

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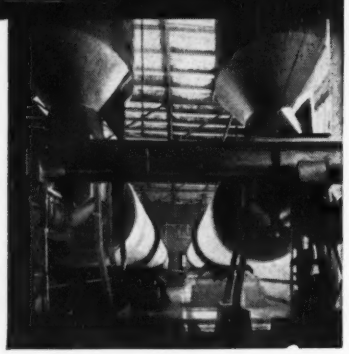
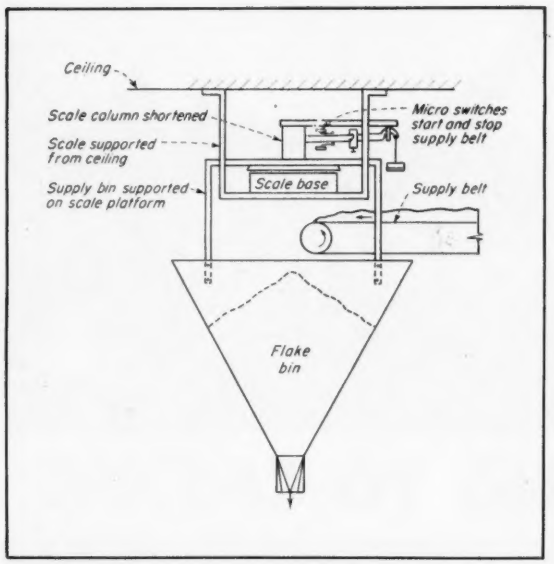




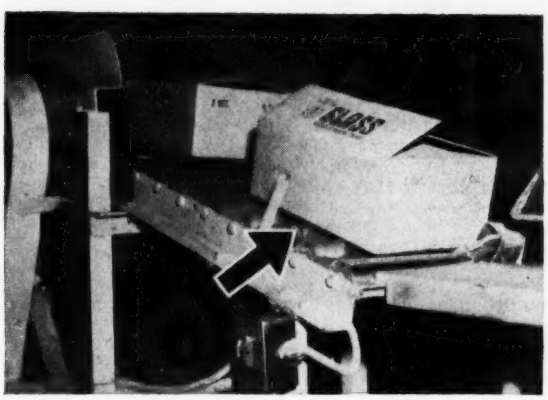
Fill of Bin is Weight Controlled

General Foods' Post Cereal Division recently installed a new 1 oz. individual size Post Toasties line in a location where the filler could not be fed from a bin of large size on a floor above.

Due to the limited headroom it was therefore necessary to install a very small bin directly above the filler on the same floor. It was then also necessary to supply the bin with materials—with Post Toasties—by means of a belt conveyor.

Since the small bin could not be maintained at proper level of fill by manual control or by any other conventional level control, it was necessary to devise a method of maintaining the correct amount of flakes in the bin.

This was accomplished by using a system of platform scales to support the bin and control the flow of flakes to the bin by means of microswitches. These latter are operated by the movement of the beam of the scale (see sketch) and in turn operate the conveyor motor.—*Ralph E. Walker, Senior Project Engineer, and Wm. J. McGillivray, Designer, Post Cereal Div., General Foods Corp., Battle Creek, Mich.*



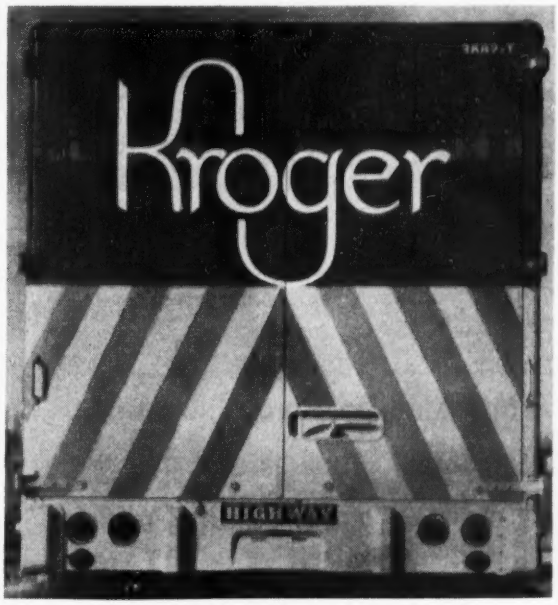
Control Assures Steady Flow of Cases

When a microswitch was installed on a roller conveyor, carton congestion ended at the bottle unscrambler. As a result, carton damage was eliminated and smoother flow of empty bottles to unscrambler was assured.

Cases are elevated from the first- to the second-floor bottling room by a flight-chain conveyor. From this conveyor, they move one at a time over a 3 ft. roller conveyor to the operator loading the unscrambler.

Weight of a case riding over one of the rolls (arrow), depresses the roll. In turn, the roll trips a microswitch, which stops the flight conveyor before another case of empties reaches the roller conveyor.

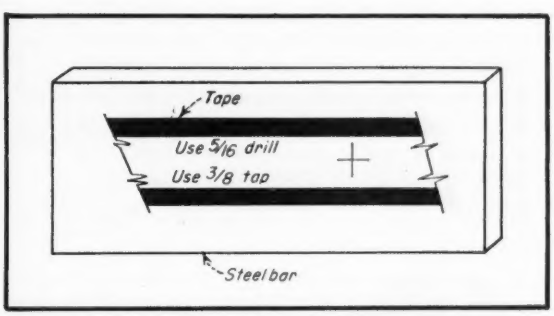
Removing a case from the rollers clears the trip to restart the flight conveyor.—*Archibald F. Beith, Master Mechanic, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*



Chooses Breakable Hinges for Trucks

Based on proven data that replacement of hinges costs less than truck doors, Kroger Co., Cincinnati, O., purposely installs readily breakable aluminum hinges (see photo on rear doors of trucks and trailers.

Thus when rear doors are involved in a backing-up accident, hinges break before doors are injured.—*Fleet Owner Magazine, McGraw-Hill Publishing Co., Inc.*

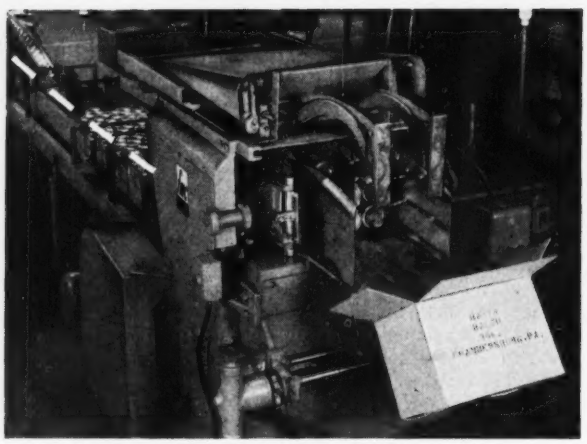


Way to Mark Steel for Drilling

When we wish to do an accurate job of marking steel for drilling operations, we use for the purpose, Labelon tape.

A piece of this material is placed in the area to be drilled. The marks which are made on it are much more easily identified on the white material than they would be on the

FROM HARVESTING TO CASING



FMC "Stalk to Storage" Corn Equipment Produces a Higher Yield—Delivers a Quality Pack

FMC has virtually grown up with – and in – the corn canning industry, helping it grow through continuous contributions of research and modern equipment development. Many of the industry's achievements – its supremely high standard of quality, its ability to produce in enormous volume – are the direct results of this long and fruitful partnership. Today you'll find FMC *specialized* "Stalk to Storage" corn equipment in every corn canning plant in the country, many of which are completely FMC equipped. And every year you'll find new and improved equipment that has been carefully designed to do specific jobs better, faster, for greater profit for you. Some of this equipment is shown or briefly described here. Your line should also include FMC Fillers, Sterilizers, Labelers and other Can Handling Equipment.

Above: **The FMC SWEET CORN HARVESTER** *gets all the corn in the field, produces corn for canners, freezers, even for the cob-corn market! It replaces a hand-picking crew of 10 and at greater yield.*

Below: **FMC's NON-SHOCK CASER** *automatically cases cans fast (up to 1,200 cases per hr.)—limited only by the speed of the operator. It's gentle to cans, labels and products, cuts costs.*

OTHER FMC CORN HANDLING EQUIPMENT

- **FMC PEERLESS CORN WASHER** tumbles, scrubs and rubs ears together under high pressure water sprays. Removes all loose husks, silk and dirt.
- **FMC DOUBLE HUSKER** cleanly trims butts and strips husks at 2½ tons of corn an hour. Unequalled for efficiency!
- **FMC EAR CORN SILK BRUSHER,** with its brushes spinning at high speed, washes and scrubs every row of kernels of every ear, removing all silk. The larger handles output of 20 FMC Huskers; the smaller, that of 8 Huskers.
- **FMC UNIVERSAL ROTARY CORN CUTTER**—a key machine in any corn line for maximum recovery of kernels from the cob, for cream style or whole grain packs. Up to 120 ears per minute depending on operator's skill.
- **FMC SANITARY BLENDING MIXER** meets the most rigid sanitary specifications for mixing and heating cream style corn. All contact parts are of durable, easy to clean stainless. 3 sizes.

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Canning Machinery Division

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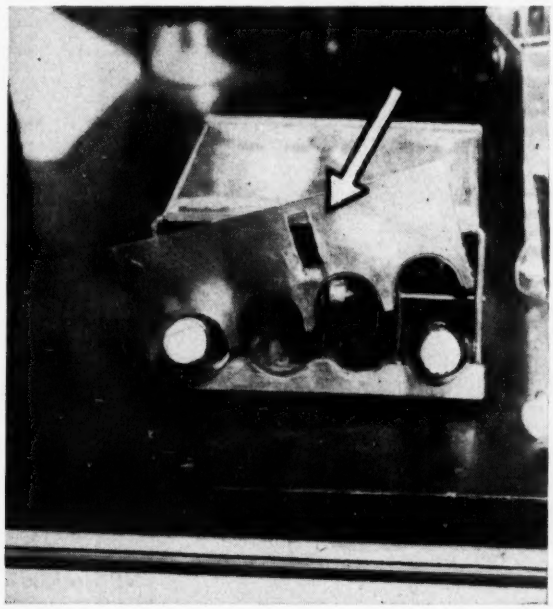
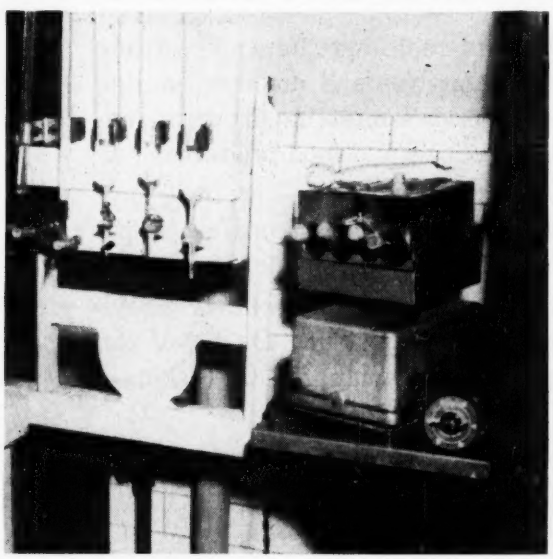
metal. In addition these marks are more clearly defined than it is possible to make marks on steel through the use of chalk or soapstone.

Another advantage of the use of tape is that the marks are not subject to hand smearing nor to disappearance through contact with cutting oils, etc.

In the event the layout is to be done by one person and performed by another, chances of mistakes are minimized by marking sizes on the tape (see sketch) as illustrated.—*A. J. Morgan, Jr., Norfolk Coca-Cola Bottling Works, Norfolk, Va.*





Shaker Improves Tests, Ups Morale

In performing Mojonnier fat tests, at least three reagents are added to samples in flasks with shaking for definite periods between each additions. Monotony of this shaking operation causes technicians to become careless which, in turn, is reflected in inaccuracies of test results.

To overcome these shortcomings, I devised an automatic shaking procedure which removes the drudgery while improving accuracy of fat analyses.

First step was alteration of a Mojonnier centrifuge basket by cementing strips (7 x 1¼ x 3/13 in.) of firm rubber sheeting down a side and across bottom of each of the four flask compartments.

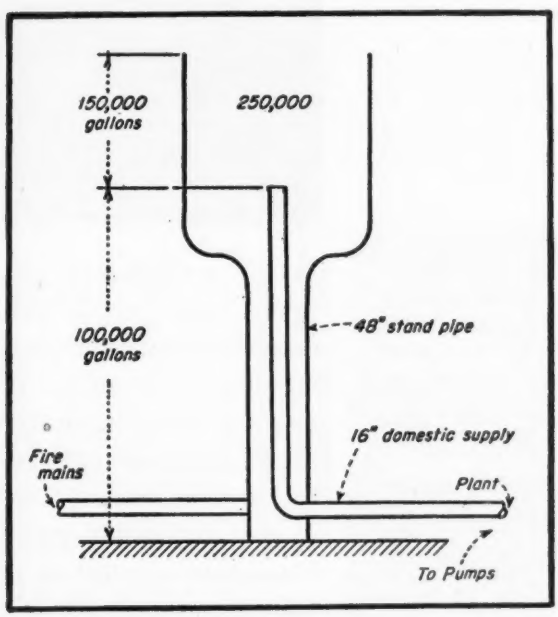
Then an appropriately shaped 2-piece lid was made of stainless steel with rubber sheeting cemented to sides that contact flask edges (see first photo). One part of lid was soldered to basket, the other was removable, but could be fastened to basket by a spring clamp (soldered to side of basket) that protruded through rectangular hole in this section (arrow).

Next, a variable speed Eberbach clinical shaker was purchased, and fitted with a stainless box of size and shape to hold the altered centrifuge basket (bottom photo). Front and back of box were lined with sheet rubber to hold basket securely during shaking.

An electric timer was attached to the shaker to automatically control length of shaking period.

With this equipment, flasks remain in basket throughout the various reagent additions, and during shaking and centrifuging steps.

In addition to improving working conditions and accuracy of test results, the procedure has minimized handling of individual flasks and speeded addition of reagents.—*Walter Bartsch, Chief Chemist, Pioneer Ice Cream Div., Borden Co., Brooklyn.*



Dual-Purpose Water Tower

Water for both fire protection and plant purposes is supplied from the same water tower at Seabrook Farms, Bridgeton, N. J. Yet there is no danger that the plant will draw the water too low for extinguishing a fire if that emergency should arise.

A 250,000-gal. tank is mounted above a 48 in. standpipe to which the fire-fighting-system water main is connected. Inside this large standpipe is a 16 in. pipe that supplies water to the plant. And this smaller pipe extends upward inside the water tower tank far enough that there is 150,000 gal. of water above the level of its intake, and 100,000 gal. below that level.

With this arrangement, there always remains 100,000 gal. of water for emergency fire use.—*FE staff.*

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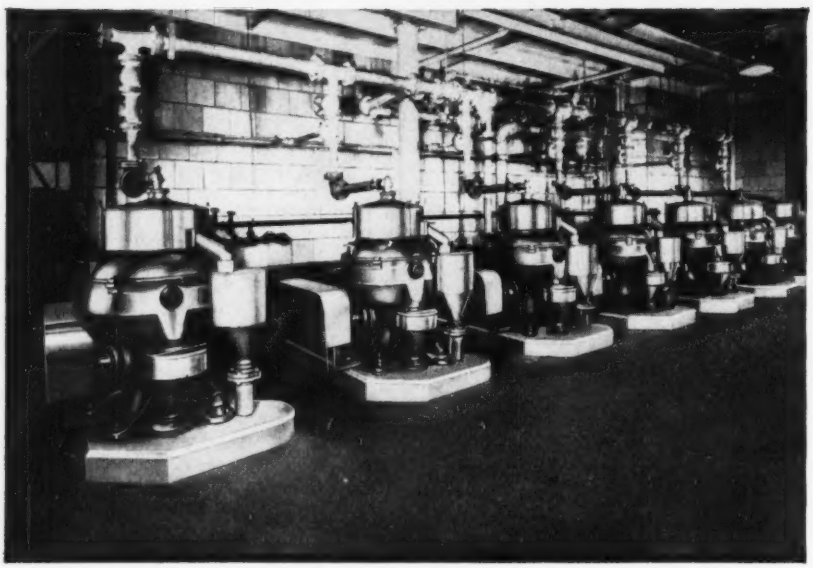

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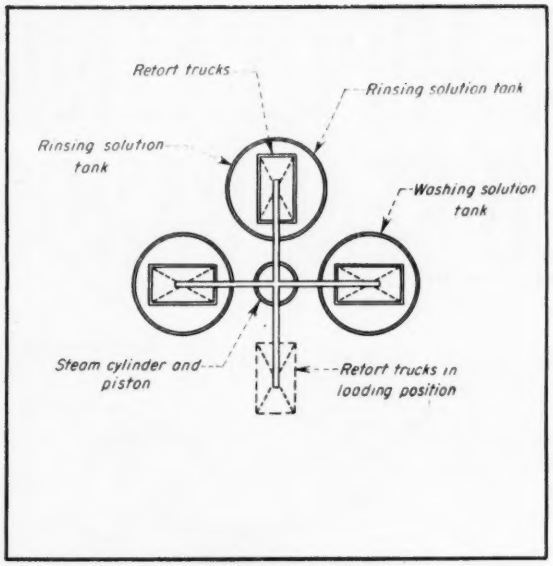
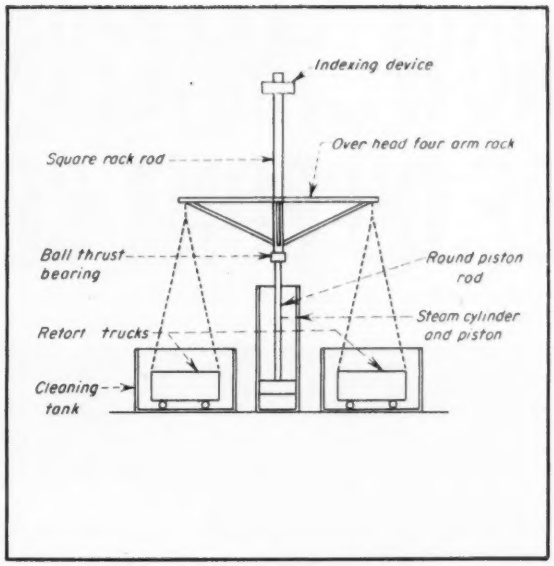




Retorted Cans Washed in Crate

Problem of cleaning cans filled with meat products after retorting has been solved for a large, meat canning plant handling thousands of various sized cans daily. A large percentage of the products were packed in 6 lb. round and rectangular containers. Major product packed was corn beef which left considerable free grease on the cans after retorting. It was necessary to remove this grease entirely before delivering cans to the labeler—or risk having labeling difficulties.

Horizontal-type retorts containing two trucks per unit are employed. Formerly various sized cans after processing were washed in a horizontal chain and bucket-type conveyor which travels in a horizontal direction, then dip the buckets into two tanks of hot cleaning solution.

The cans were removed from the retort trucks by hand and placed into the conveyor buckets. Again after washing, the cans were transferred by hand out of the conveyor buckets.

Now the contents of the mobile retort crates are washed free of grease without removing the containers from the crates. Thus eliminated is the manual handling during the washing operation. Manhours required for washing have been reduced from 240 to 16.

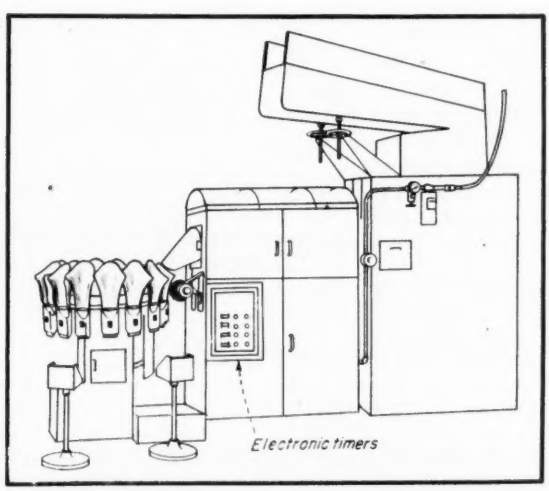
Here is the construction of the mechanism which permits thorough washing of the greasy containers without removal from the retort crate.

Three vertical open-top round tanks (see sketch), each of sufficient size to accommodate a retort truck, are located equadistant from a vertical steam cylinder and piston. Latter operates an overhead four-arm mechanism built of sufficient size and strength to lift from the extremity of each a retort truck filled with cans. The ends of arms and the center of the wash tanks coincide.

Through a ball thrust bearing, shaft and rack can be rotated in a horizontal plane. Manual device operates four-point indexing to hold rack beams in centered position over the tanks during washing operations.

First tank is filled with hot cleaning solution—usually caustic soda maintained at 180 deg. temperature. Two following tanks are filled with hot rinse water at the same temperature. Retort crates are first "dunked" in the caustic solution, then in the two rinse solutions.

"Dunking," a slow up-and-down motion, is obtained by admitting steam to the cylinder slowly on the lifting cycle and releasing it from the cylinder slowly on the lowering cycle. Five or six dunkings are usually sufficient to entirely free the cans of grease and foreign matter.—*John Pickering, Consulting Engineer, St. Clairsville, Ohio.*



Electronic-Timed Filler

Recent packaging technique in the food industry for filling paper and cellophane bags with light bulky products such as potato chips requires automatic filling machines. These must be controlled by dependable and accurate timing devices since the material is moved by air jets and solenoid valve controlled. The timing problem has been solved by the use of electronic timers.

Two such units are used. The first one times the operation of an indexing head which places the bags in position to be filled. The second timer operates a solenoid valve which controls air blast blowing food in bag.

Maximum speed of production is obtained by the use of these electronic timers. Also, because of the ease of adjustment of these controls, flexibility of application to different size containers is provided.

Similar types of controls have been applied to filling machines in beverage and dairy industries.—*Photoswitch, Inc., Cambridge, Mass.*

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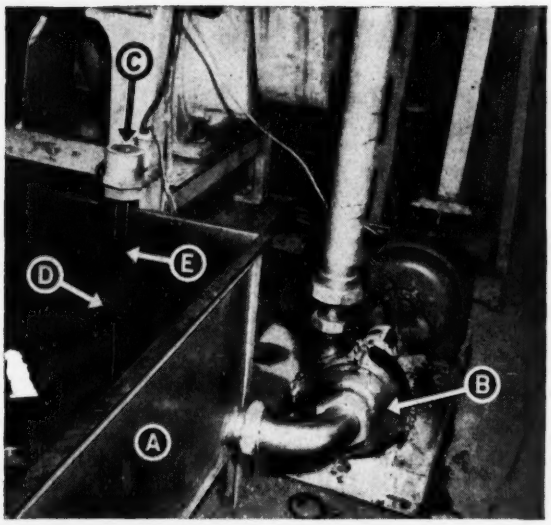
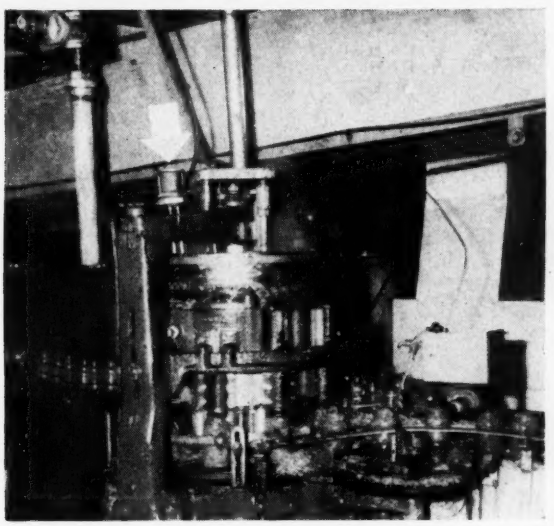




Electric Unit Controls Liquid Level

For the several purposes for which we have applied them, electrically-operated liquid level controls made by BW Controller Corp., Birmingham, Mich., have proved exceptionally successful.

One such unit is installed to maintain high-low level in intermediate tank—(A) top photo—receiving unit for tomato juice delivered from pulper and finisher. If the level in the tank rises too high, a messy overflow results and product is lost. If the level in the tank drops too low, the centrifugal type pump (B) which picks up the juice, loses its prime.

Since the electric current type liquid level controller (C) was installed, pump does not lose prime and no overflow has occurred. Furthermore, the watchful eye of a worker is no longer required to check on the level of the liquid in the intermediate tank.

Now, when the level in the tank drops below the end of the electrode (D), pump motor is stopped until level rises sufficiently to make contact with the upper control (E) which then closes the circuit to start pump motor.

Similarly, a two electrode unit—arrow, second photo—is used to maintain a uniform head in our filling machine bowls by stopping and starting supply pump. For this application there is very little difference in the length of the two electrodes.

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $50.

Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

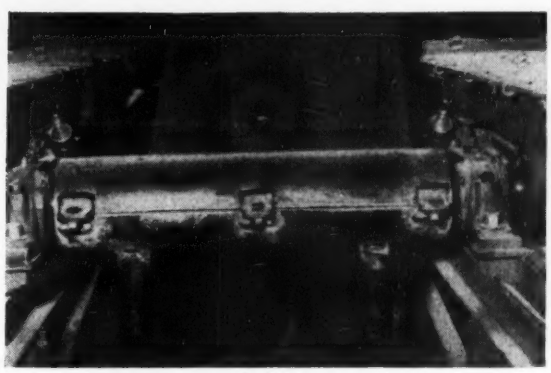
Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

APRIL PRACTICAL IDEA winner was "Moisture Control Method" submitted by Joseph T. Hogan, Chemical Engineer, New Orleans. Described and illustrated with a nomograph was a method by which it is possible to readily determine amount of liquid to be added or removed to bring a solution to desired moisture content.

In a third application only the top level of the liquid is controlled; therefore, only one electrode is required. Tank supply pump motor is stopped when liquid makes contact with this electrode at top level limit to prevent tank overflow.—*John Mattick, Plant Superintendent, P. J. Ritter Co., Bridgeton, N. J.*



Drive-Shaft Cover Permits Aisle Traffic

Installation of a safety cover for a drive shaft hooked up to two parallel 45 ft., vibrating-type bulk-sugar conveyors has prevented the possibility of accidents. Drive shaft is located at the center of a passage-way in an enclosed bridge, that spans our sugar refinery and the bulk-freight car-loading dock.

Safety cover comprises a piece of 6 in. metal pipe that was split in half lengthwise. Welded to each half pipe were six (three on each side) 1½ x 1½ in. metal flanges with ¾ in. holes for bolts. Both half-pipes were then installed around the drive-shaft and secured by six nuts and bolts. Attached to the bottom half-pipe are two 1¼-in. vertical pipes that are bolted to the floor.—*Hugh B. Wright, Superintendent of Maintenance, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*

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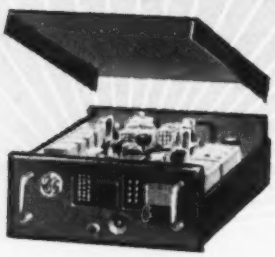

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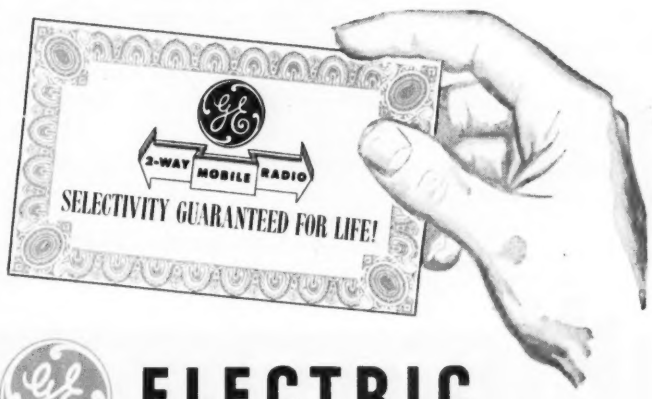

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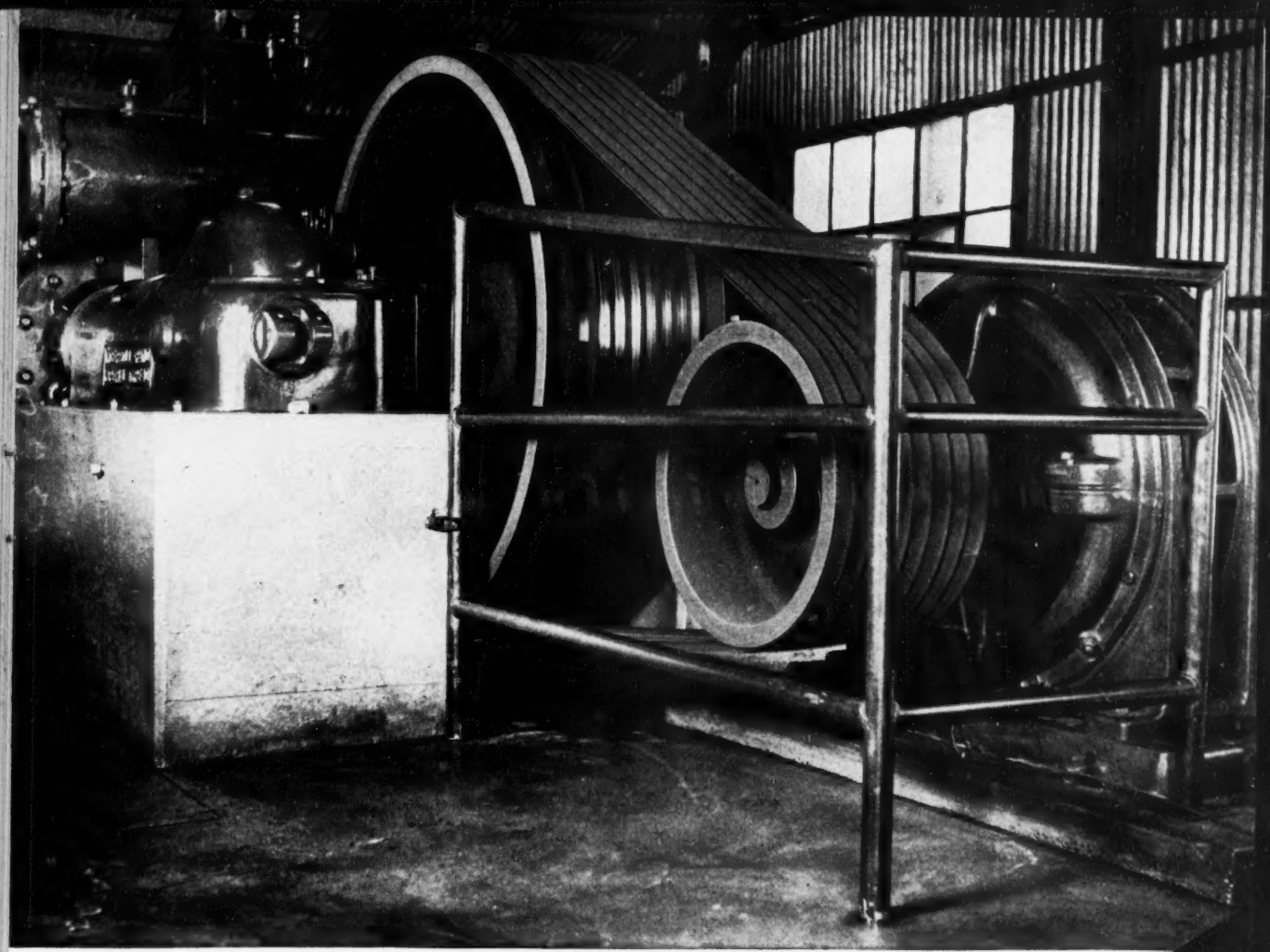

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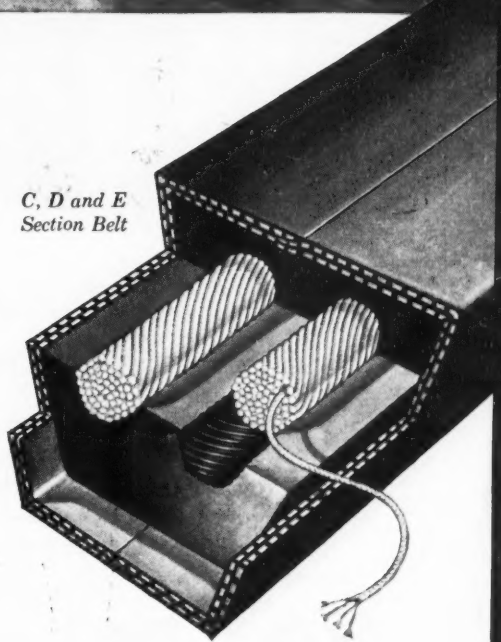

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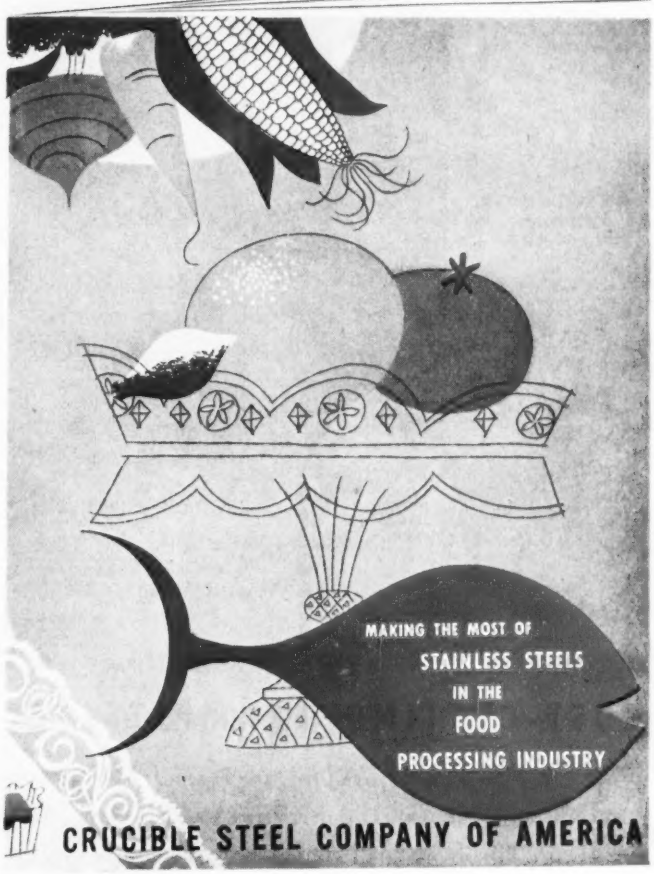

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d

Food Specialists — Note . . .

If your interests are primarily in the BREWING . . . DAIRY . . . MEAT . . . or SOFT DRINK Industries, you'll find specific helpful information in these Crucible books which show how you can make the most of stainless steels in these fields. Any of these books are yours for the asking.

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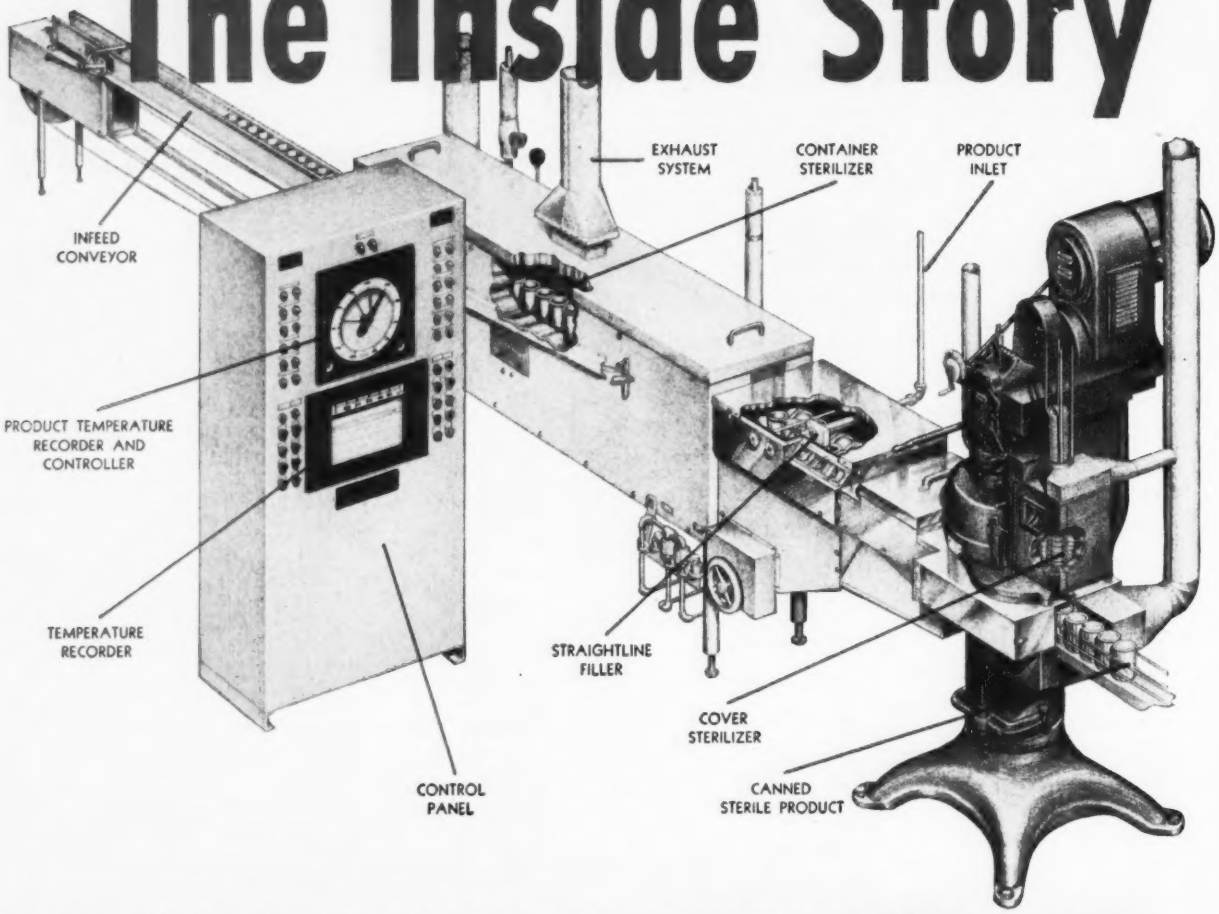
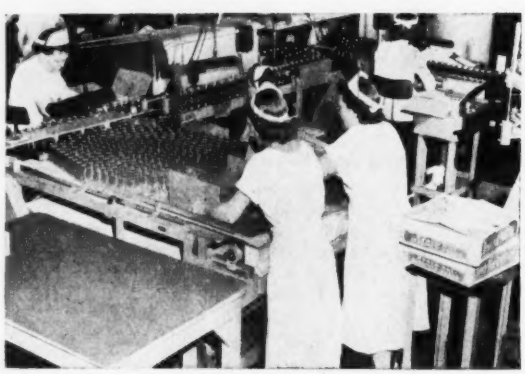
The Inside Story



COST-CUTTING EXAMPLES OF OTHER STANDARD AND

• W. F. & John Barnes offers the food processor a highly successful Coordinated Designing, Engineering, and Equipment Manufacturing Service. During the past eight years many cost-cutting methods have been developed through the designing and building of special mechanized handling and processing equipment. At Barnes you'll find competent engineering counsel, dependable facilities, and over 75 years of equipment building experience at your disposal. We'll be glad to make an analysis of your processing methods.



EMPTY GLASS SINGLE FILERS — Handle up to 600 jars per minute with minimum breakage. Design permits handling different sizes of jars. Semi-standard units available for odd-shaped jars or bottles.

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THE MARTIN ASEPTIC CANNING SYSTEM

Products with nature's true taste and eye appeal . . . with all the health-giving factors nature endowed them with . . . are now being packed through the use of the Martin Aseptic Canning System. Delicately flavored, heat-sensitive products that heretofore were considered impossible to can . . . like pureed bananas, fresh milk, cream, and other dairy products . . . are now processed without loss of flavor. All this is made possible by the Martin Aseptic Canning System, which permits the advantages of short-time, high-temperature sterilization.

In addition to offering the sales advantages of a vastly improved product, there are both mechanical and cost advantages afforded with the Martin System. Food processing is now an efficient, continuous, uninterrupted operation, entirely eliminating batch handling, retorting, and cooling. Normal floor space requirements are 20 to 40 per cent less. Efficient use of steam, water, and electricity provides additional savings. And, an Automatic Sequence Control System, developed by Barnes especially for aseptic canning, safeguards against understerilization . . . records, controls, and coordinates every phase of the canning operation for maximum, cost-cutting efficiency.

INVESTIGATE THE PROFIT POSSIBILITIES OF THIS SYSTEM TODAY

Find out how this unique canning method can help you cut food processing costs . . . improve product quality. Your problems will be given expert and individual attention.

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Describes in detail the advantages of canning with the Martin System . . . generously illustrated with photographs, charts, specifications, drawings.

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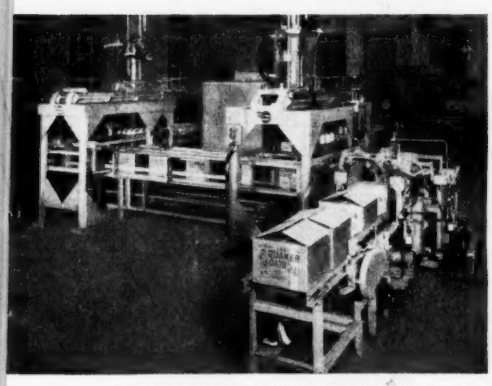
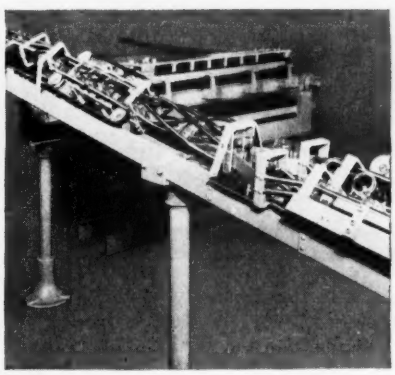
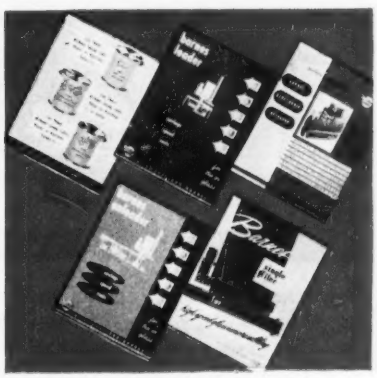


CARTON UNCASERS AND RECASERS—Electromagnetic equipment designed and built by Barnes to uncase, unscramble, count, pattern-form, and recase tin containers automatically. Unit shown performs both operations. Individual units available to uncase or recase.



SPECIAL CONVEYORS AND ELEVATORS—A wide variety of conveyors, teloscopic elevators, can elevators, inspection line conveyors, etc., designed and built by Barnes, speed processing and reduce work-handling in food and beverage plants.



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Complete and detailed information on how Barnes' food processing and handling equipment can help your production problems. Write today for free literature.

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PROCESS EQUIPMENT DIVISION
303 SOUTH WATER STREET • ROCKFORD, ILLINOIS

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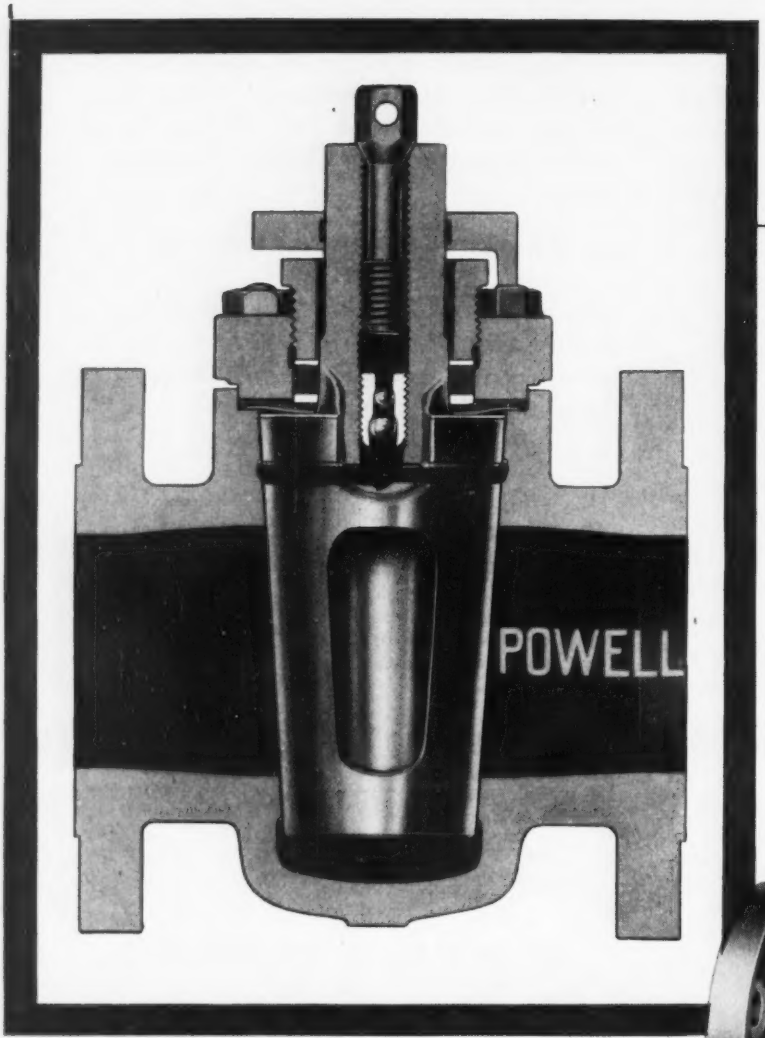
B.F.Goodrich announces

Powell LUBRICATED PLUG Valves

Now! A great new line of valves that maintain the Powell standards of precision!



Investigate these outstanding new Lubricated Plug Valves that carry the Powell name and measure up to the Powell standards of precision. Features include quick and positive operation – just a quarter-turn to open or close. Lubricant grooves surrounding each port provide a positive seal when the valve is closed. In an open position, seating surfaces are not exposed.

Available in Semi-Steel and Carbon Steel through distributors in principal cities. For descriptive literature–or help on valve problems–write direct to The Wm. Powell Company, Cincinnati 22, O.

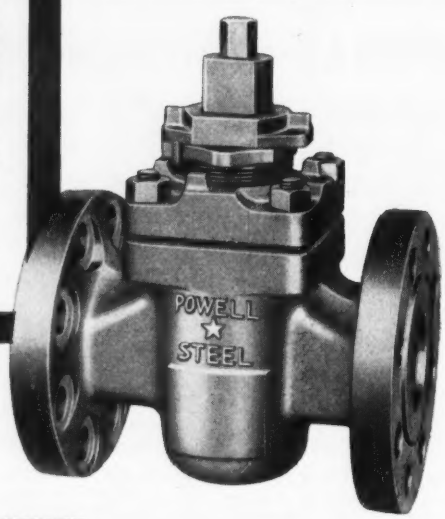
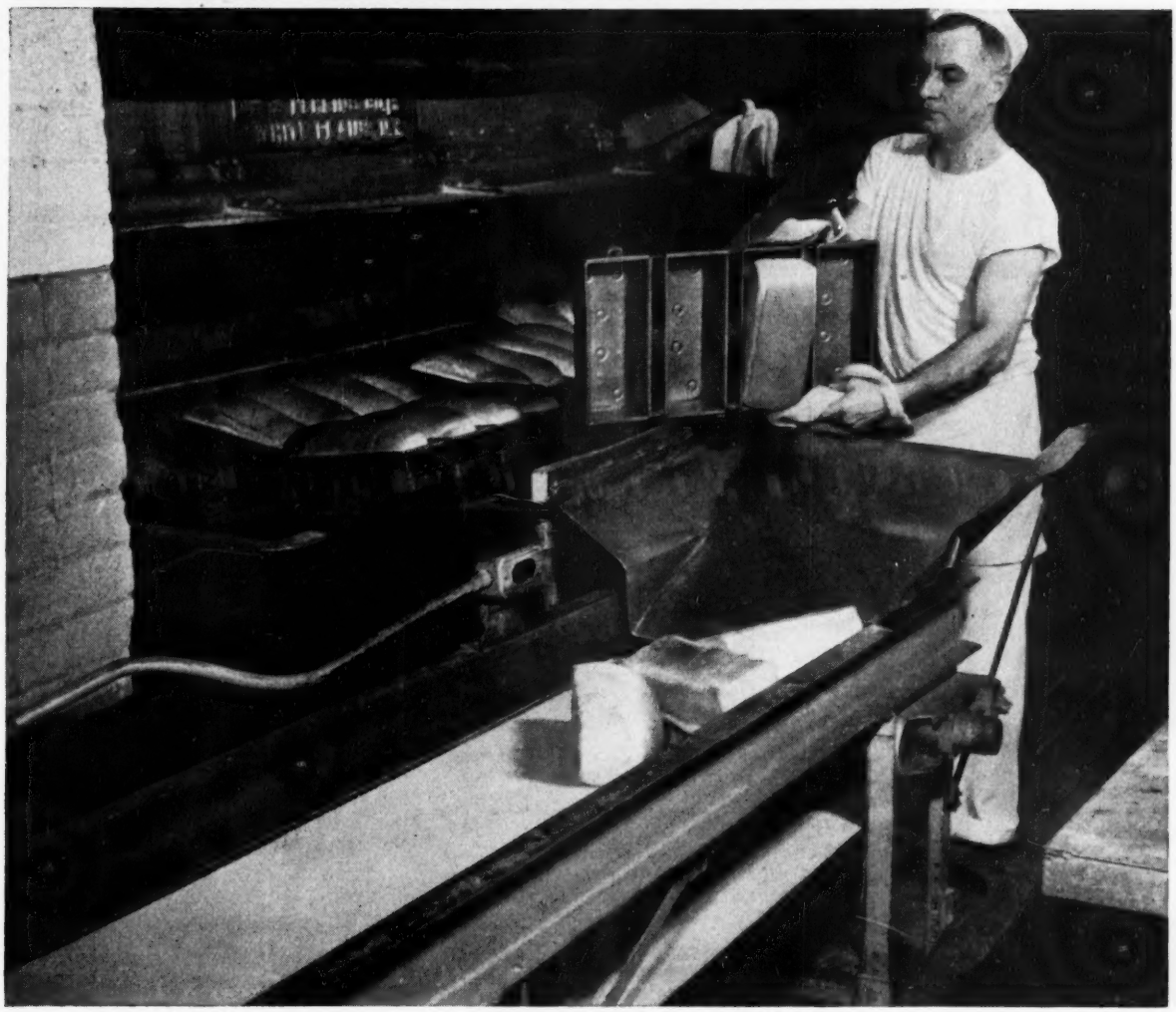


FIG. 1559 — 150-POUND STEEL FLANGED END LUBRICATED PLUG VALVE. *(300-pound Steel, Fig. 3059.)* Available with Screwed or Bolted Glands. Semi-Steel valves available for 175 and 200 pounds W.O.G. Carbon Steel valves available for 150 and 300 pounds W.P.

CONTROLS FOR THE LIFE LINES OF INDUSTRY

Powell Valves *108th year*

B. F. Goodrich announces



New Koroseal belt has no odor, no taste, never gets rancid

In this bakery, fresh bread used to ride a canvas belt from ovens to wrapping tables. But oily film clinging to the warm loaves stained the canvas, made it impossible to keep clean, soon ruined it.

Then the smooth, polished Koroseal belt in the picture was tried, and it solved all these problems at once. Because it's made of Koroseal flexible material, this new B. F. Goodrich belt stands cooking oils, animal fats, most acids—and stands hard use, rough handling, and just about everything else that ruins most materials.

Unlike belts that are just coated with plastic, Koroseal is used throughout this B. F. Goodrich belt, and so resists cracking and peeling, never gets soft or sticky. Oil can't penetrate Koroseal's tough surface, food particles can't grind in. That's why this belt is so easy to clean. Most stains, grease, even sticky icings come off with a damp cloth. Either way, cleaning time is cut in half!

Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

Find out more about these longer-lasting, work-saving food handling belts. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll have him call you. *The B. F. Goodrich Company, Dept. M-256, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

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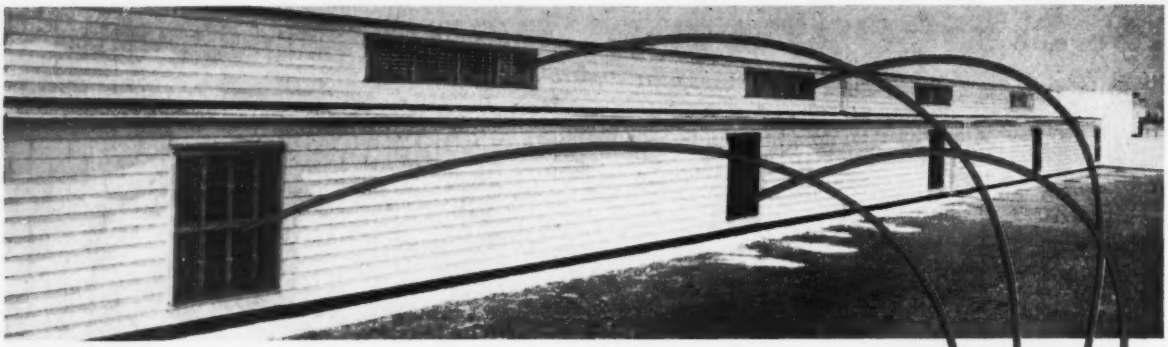
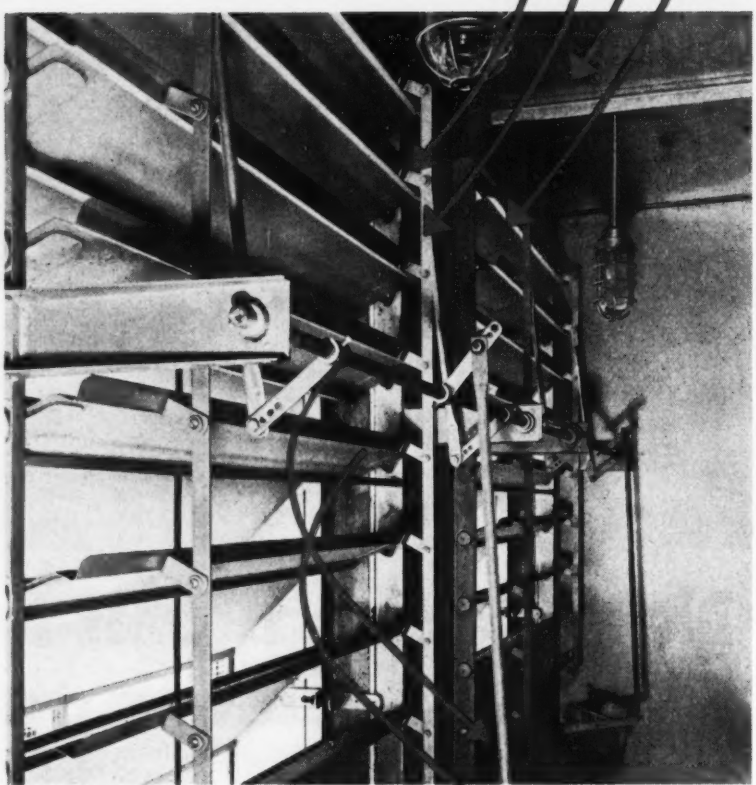


Corrosion is out the window HERE



Photos show air conditioning apparatus house, and fresh air louvre units manufactured by The Bahnson Company, Winston-Salem, N. C. Coatings were formulated by **Specialty Coatings, Inc., Division of Thompson & Co.,** Oakmont, Pa.

The steel framework, fixed louvres, and dampers of this textile-mill air conditioning installation are thoroughly protected with coatings based on BAKELITE Vinyl Resins.

The whole unit is exposed to the outside—to potentially corrosive industrial atmosphere, high humidity, and changeable weather and temperatures. Protection is a must.

That's why coatings based on BAKELITE Vinyl Resins were specified. They can be depended on *all the time*—for high resistance to acids, alkalies and most other chemicals, salt water, industrial gases, and weather extremes. And they adhere tightly to all surface materials . . . even under conditions of expansion and contraction, and resist wear from moving parts.

BAKELITE
TRADE-MARK
Phenolic, Vinyl, Styrene
RESINS FOR COATINGS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
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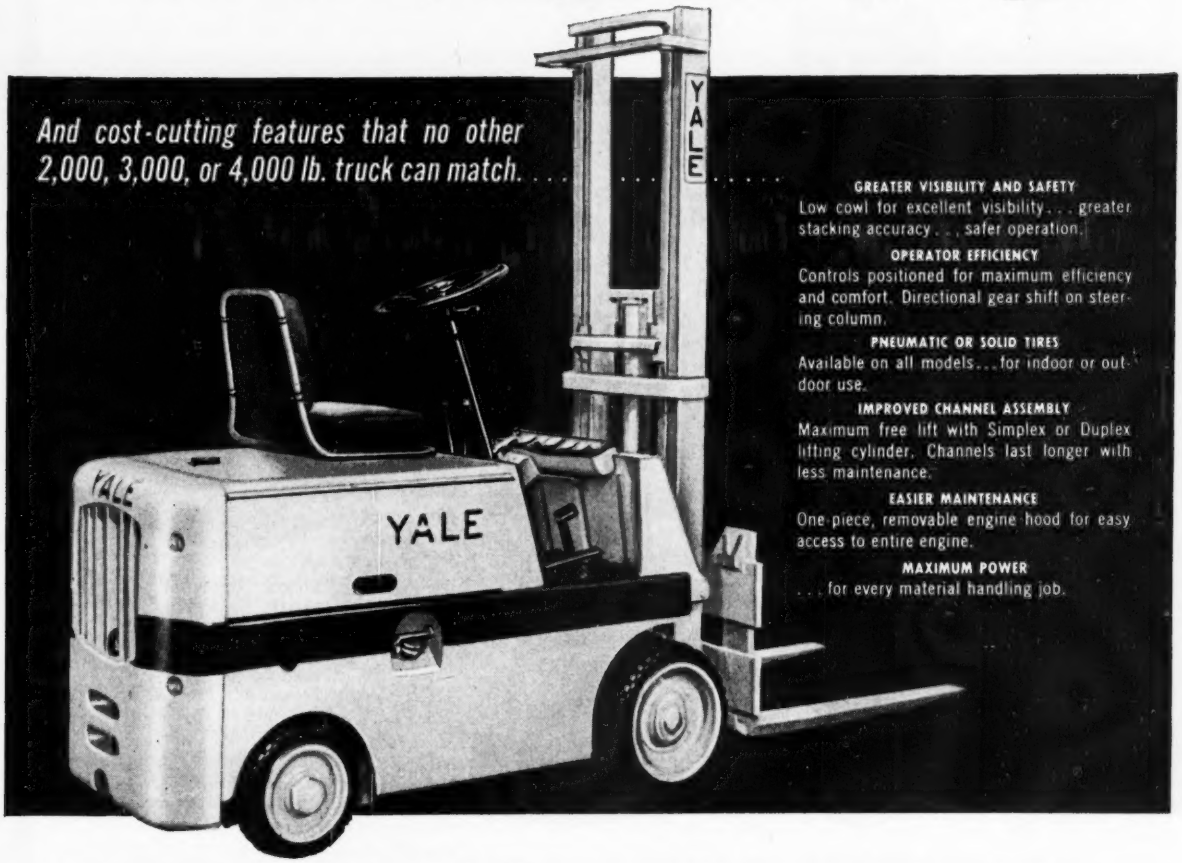
30 East 42nd Street, New York 17, N. Y.

FIRST 2,000 LB. GAS TRUCK WITH YALE FLUID COUPLING

. . . in this capacity and over-all length


And cost-cutting features that no other 2,000, 3,000, or 4,000 lb. truck can match. . . .
YALE
YALE
GREATER VISIBILITY AND SAFETY
Low cowl for excellent visibility . . . greater stacking accuracy . . . safer operation.
OPERATOR EFFICIENCY
Controls positioned for maximum efficiency and comfort. Directional gear shift on steering column.
PNEUMATIC OR SOLID TIRES
Available on all models . . . for indoor or outdoor use.
IMPROVED CHANNEL ASSEMBLY
Maximum free lift with Simplex or Duplex lifting cylinder. Channels last longer with less maintenance.
EASIER MAINTENANCE
One-piece, removable engine hood for easy access to entire engine.
MAXIMUM POWER
. . . for every material handling job.

All the proven economy and durability of YALE Fluid Coupling are now available in a short, lightweight Truck. This latest YALE Truck, in capacities from 2,000 to 4,000 lbs., has exclusive, cost-cutting features . . . can't be beat for all-around handling speed, safety and efficiency. And you can put it to work without delay . . . without major investment . . . under the exclusive YALE "3-Way-Finance-Plan." Mail coupon for complete details.

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Gas, Electric, Diesel & LP-Gas Industrial Trucks • *Worksavers* • Hand Trucks • Hand & Electric Hoists • Pul-Lifts

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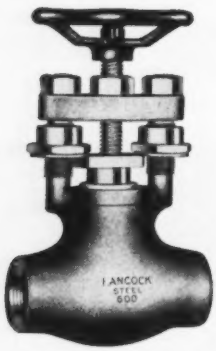
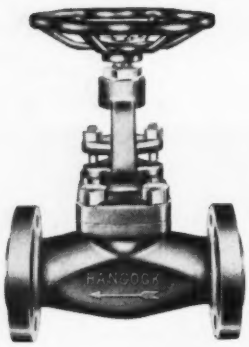
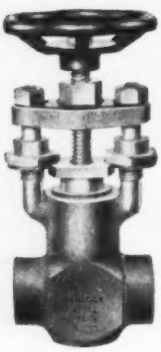
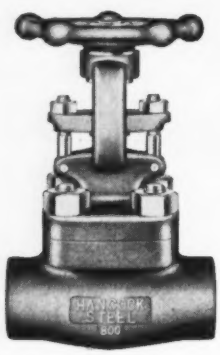


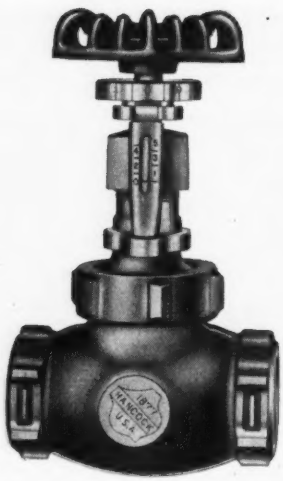


600# Steel Valves. Dependable, trouble-free in the severest services. **Sizes: No Bonnet Joint Design** (left) — ¼" through 2". **Bolted Bonnet Design** (right) — 1¼" through 2". **Types:** Globe and Angle. **Connections:** Screwed, Socket Weld and Flanged Ends. **Service Ratings:** For **all** pressures up to 850 psi at 750° F. — O.W.G. 2000#, 100° F.





800# Steel Gate Valves. More than meet the requirements of process piping systems. **No Bonnet Joint Design** (left). **Sizes:** ¼" through 2". **Connections:** Screwed and Socket Weld Ends — for **all** pressures up to 800 psi at 775° F. — O.W.G. 2000 psi, 100° F. **Bolted Bonnet Design** (right). **Sizes:** ¼" through 2". **Connections:** Screwed, Socket Weld and Flanged Ends. Type 950 illustrated offers these alternate trims: (a) Cobalt-Chromium-Tungsten Alloy, Hard Facing — "420 Brinell"; (b) 18-8% Stainless or 20% Nickel, 8% Chrome; (c) Monel; (d) Hastelloy. **Service Ratings:** For **all** pressures up to 800 psi at 775° F. — O.W.G. 2000 psi, 100° F.



Bronze "Flocontrol" Valves. 3-in-1 design combines variable orifice, shut-off and index. **Types:** Globe and Angle. **Sizes:** ¼" through 2". **Connections:** Screwed Ends. Available in 150# and 300# series.

HANCOCK VALVES

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your telephone. Take advantage of his knowledge and experience in selecting the right Hancock Valve for each service requirement. You can depend on him for prompt deliveries from local stocks.

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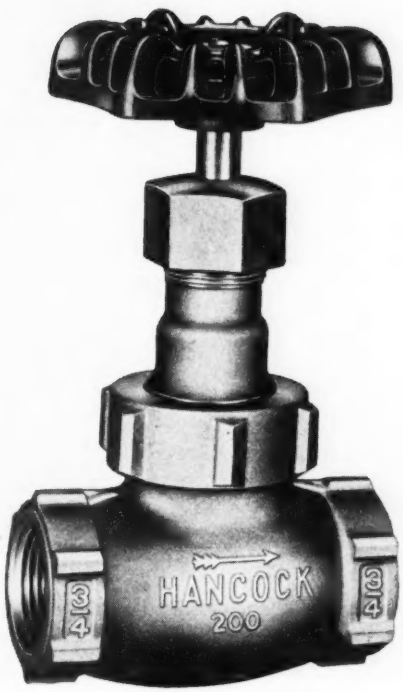
To get the most value from your valve investment, you must have the assurance of efficient, trouble-free performance.

Hancock Valves give you economy of quality that makes them your best buy in terms of long, reliable service. They have advanced construction and operational advantages found in no other valves — features backed by more than 75 years of pioneering new designs, new materials and new manufacturing techniques in anticipation of changing needs.

Rugged, precision-built Hancock Valves are noted for dependable tightness month after month under the most adverse conditions of use. They do a job and stay on the job—withstand the deteriorating effects of wire drawing, galling, steam cutting, erosion and corrosion far longer because they are functionally designed and made from carefully selected materials of the highest quality. Standardization of parts in all sizes of each type of valve provides the interchangeability factor so essential to simplified inventory and low-cost maintenance.

The operational perfection and extra service life engineered into all Hancock Valves are yours at the cost of ordinary valves. Whether you are adding new capacity to present facilities, planning a new plant or a revalve project, learn all the money-saving reasons why Hancock Valves belong in your specifications. Complete information is yours on request.



Bronze Valves. Extra tough for leak-proof service. 125% to 230% stronger diaphragm than ordinary bronze valves. **Types:** Globe and Angle. **Sizes:** ¼" through 2". **Connections:** Screwed Ends. Available in 150#, 200# and 300# W.S.P. ratings, 550° F.

When Hancocks go in, valve costs go down.

1877 HANCOCK U.S.A.

A PRODUCT OF MANNING, MAXWELL & MOORE, INC.

WATERTOWN 72, MASSACHUSETTS

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' AND 'AMERICAN-MICROSEN' INDUSTRIAL INSTRUMENTS, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

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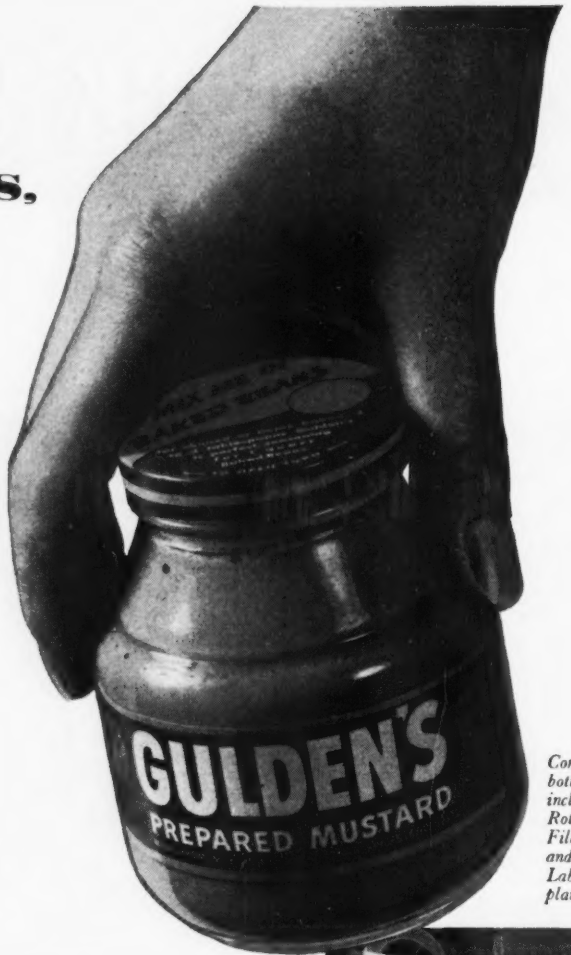
"Pass the GULDEN'S, please"



Conveyor synchronized bottling line which includes a Pneumatic Rota Cleaner, Rotavac-18 Filler, Four-Head Capper and Direc-Transfer Labeler, at Gulden's plant in New York City.

Millions prefer this mustard—

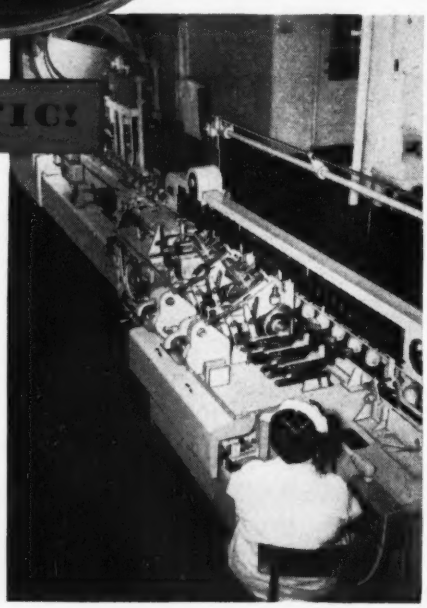
completely bottled by PNEUMATIC!

GULDEN'S Prepared Mustard has been "pepping up" good food for a good long time. It has established its name, its quality and its worth beyond question.

Bottling is an all important part of the process of preparing this product for sale. For an impressive number of the many years that GULDEN has been making its mustard, PNEUMATIC machines have been doing the air cleaning, filling, capping and labeling of the containers GULDEN'S comes in. Doing it with such smoothness and accuracy that GULDEN'S regard for the efficiency and economy of PNEUMATIC equipment has grown greater as their experience with it has stretched beyond the thirty-year mark.

This experience is duplicated in many, many plants . . . in the packaging and bottling of a great, ever growing variety of products.

Look to PNEUMATIC — as other leaders do — for "lower cost per container".



PNEUMATIC SCALE CORP., LTD., 91 Newport Ave., Quincy 71, Massachusetts
Also: New York; Chicago; San Francisco; Los Angeles; Seattle; Leeds, England.
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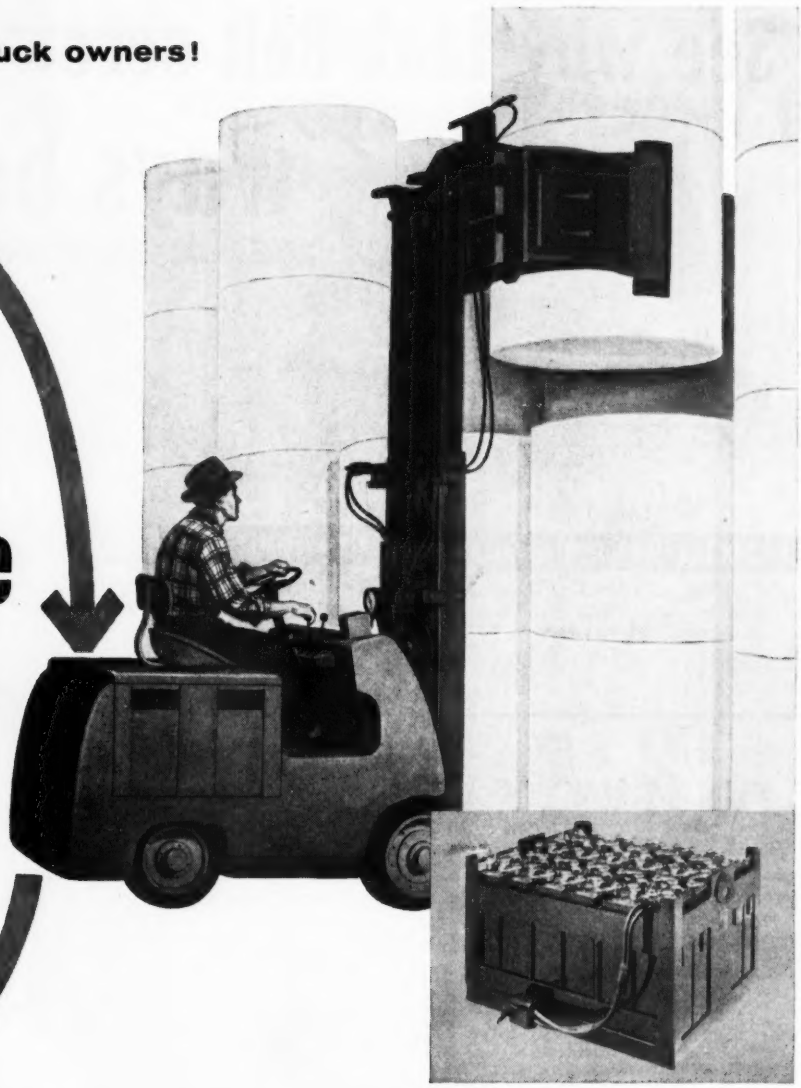
Packaging and Bottling Equipment

news for industrial truck owners!

Now... 25% more capacity here



... with the New EDISON "MC" type Battery!

Specifically designed to provide more power for modern driver-ride, sit-down fork trucks, this newest EDISON battery development provides *25% more capacity* than ever before available in nickel-iron-alkaline batteries . . . to suit the limited battery compartments of such industrial trucks. Extra power too, for operating various hydraulic devices which speed handling in plants and warehouses.

Besides this unusual space-capacity ratio, the new "MC" offers all of the profitable features that are typical of EDISON Nickel-Iron-Alkaline Storage Batteries: steel plates and cell containers for the most rugged, long-life service—electrical characteristics that assure foolproof operation and outstanding dependability.

And like all EDISON batteries, the new "MC" is designed and built to give *more than twice the performance life* of other type batteries. Be sure to investigate this new EDISON development today!

If you operate battery electric industrial trucks, or are planning to purchase one soon, be sure to have the complete facts on the new EDISON "MC" type battery. Clip the coupon below and mail it today.

Edison Storage Battery Division
Thomas A. Edison, Incorporated
505 Lakeside Avenue
West Orange, N. J.

I'm interested in the new MC battery—

☐ Send me complete literature
☐ Have your representative call

NAME _____
TITLE _____
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Most dependable power... lowest over-all cost you get both with an EDISON

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Nickel · Iron · Alkaline
STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

For more information, use coupon on page 181.

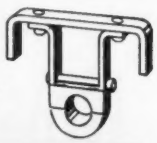
See why Link-Belt screw conveyors are 8 ways better

1. LOOK FOR UNIFORMITY OF PITCH

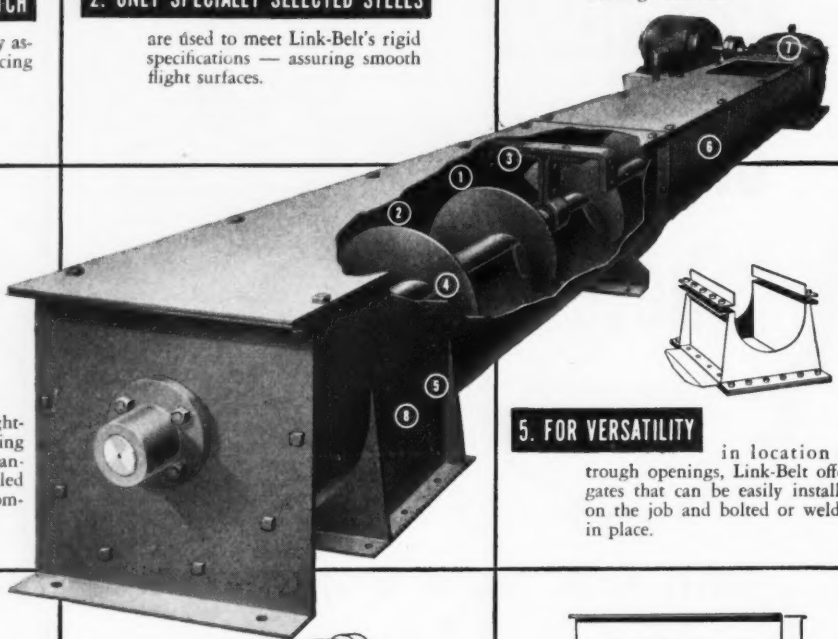
Specialized modern machinery assures accurate forming, producing uniform flighting curvature.

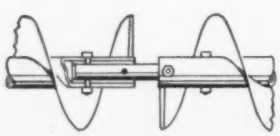
2. ONLY SPECIALLY SELECTED STEELS

are used to meet Link-Belt's rigid specifications — assuring smooth flight surfaces.



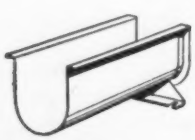
3. HERE'S A WIDE RANGE of hanger styles and mountings with various bearing materials.



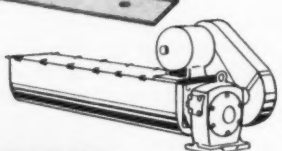


4. FOR YOUR PROTECTION straightness is checked before shipping and extra care is taken in handling and loading. Jig-drilled coupling bolt holes assure complete and easy assembly.

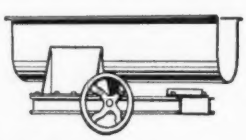
5. FOR VERSATILITY in location of trough openings, Link-Belt offers gates that can be easily installed on the job and bolted or welded in place.



6. YOU'LL DISCOVER that troughs are accurately fabricated to assure better fit of all components. Link-Belt offers a choice of metals to fit your particular application.



7. ONLY LINK-BELT builds a complete integrated line of gear and chain drives, couplings, bearings. One proved source . . . one undivided responsibility.



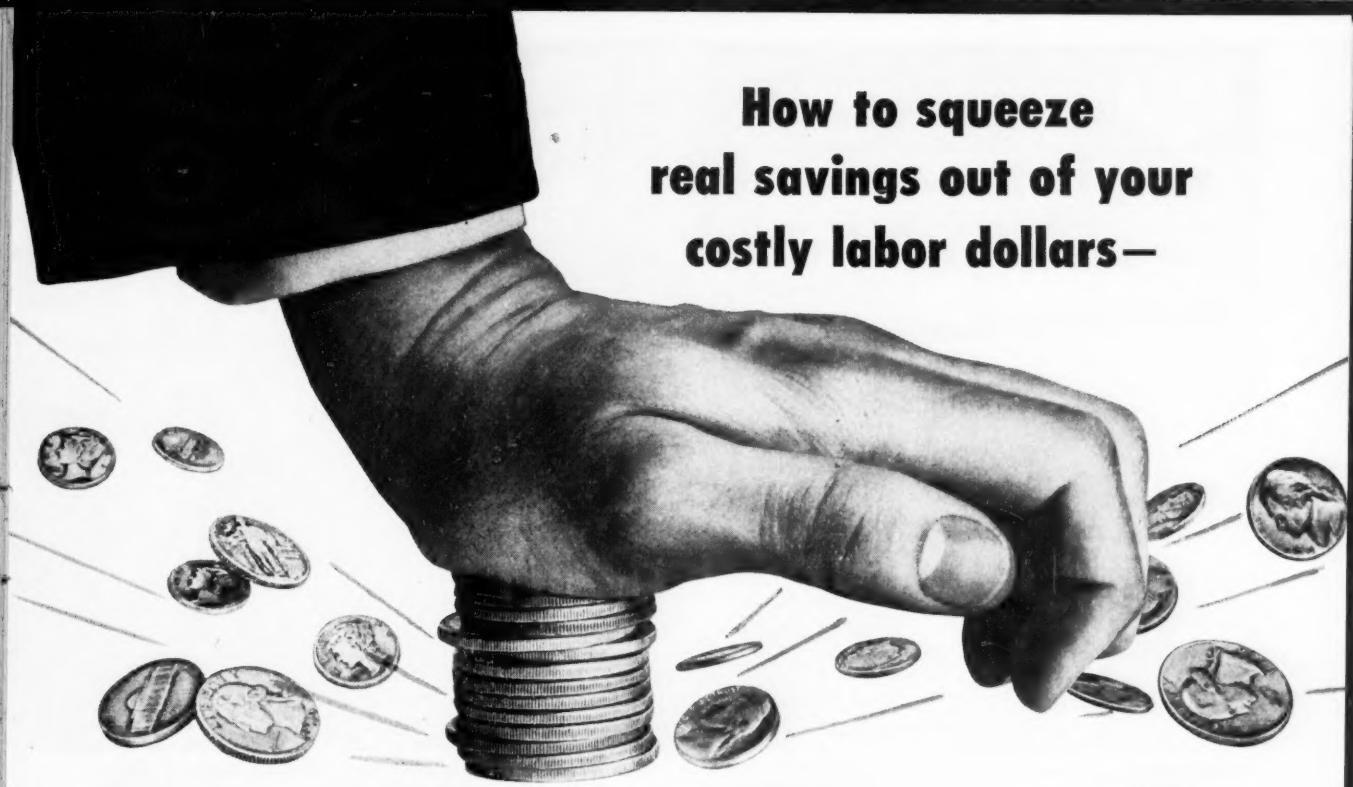
8. YOUR CHOICE of fixed or detachable plain discharge spouts or gates. Flat or curved slide type gates can be hand or rack-and-pinion operated.

LINK-BELT

SCREW CONVEYORS

These are only a few of the many important differences in screw conveyors. Ask your Link-Belt sales representative or distributor for new 92-page Data Book 2289.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 19,278



How to squeeze real savings out of your costly labor dollars—

Simplify and Save THE PURE OIL WAY!

6-WAY SAVINGS!

1. Simplifies Lubrication
2. Speeds-Up Application
3. Minimizes Mis-application
4. Cuts Down Inventories
5. Eases Stock Control
6. Streamlines Purchasing

Be sure with Pure—Sales offices located in more than 500 cities in Pure's marketing area.

Chances are, you can save real money on costly *man-hours* and *machine maintenance* by *simplifying* your lubrication schedule right down the line from purchasing to application.

Scientifically formulated to do many jobs equally well, Pure Oil's *money-saving lubricants* reduce inventories from many different oils and greases to a few *multi-purpose lubricants*.

Pure Oil multi-purpose lubricants not only cut down the number of lubricants but also eliminate the danger of mis-application and time-consuming identification of single purpose oils and greases.

Put this money-saving program to work in your plant! Write for our free booklet giving you full details.

It Starts Here!

BE SURE PURE WITH PURE

PURE OIL INDUSTRIAL LUBRICANTS

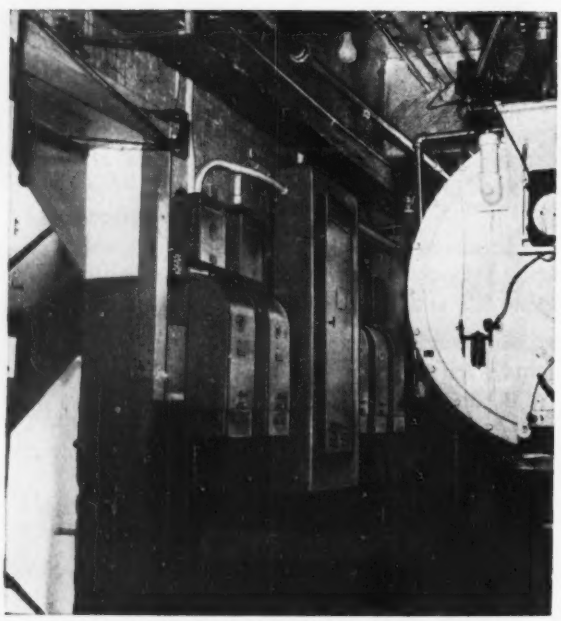
FREE BOOKLET

The Pure Oil Company, Industrial Sales Dept. H-46
35 E. Wacker Drive, Chicago 1, Illinois
Please send me your free booklet on how to "Simplify and Save"

NAME_____
POSITION_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

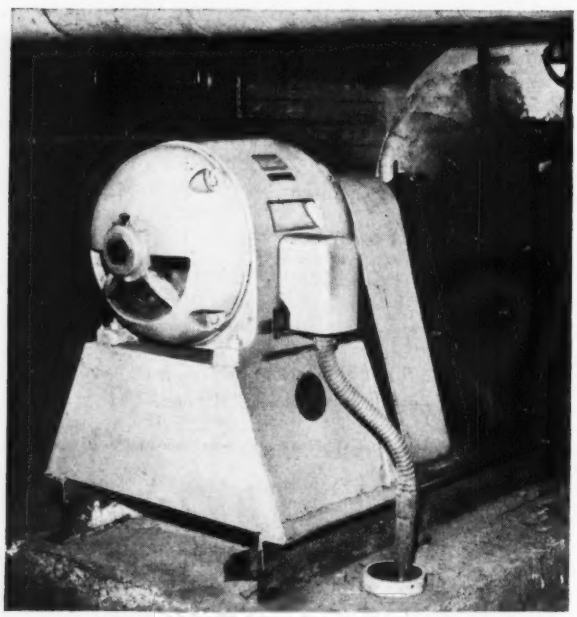
TOUGH, VERSATILE TRI-CLAD* MOTOR can be installed anywhere—will provide top performance and long life even under the most difficult operating conditions. Here the G-E drive is mounted on top of the five-roller refiners at Rockwood's Brooklyn plant. The Tri-Clad motor is controlled through G-E equipment conveniently mounted on rear wall.

Rockwood Chocolate Co. finds G-E drives



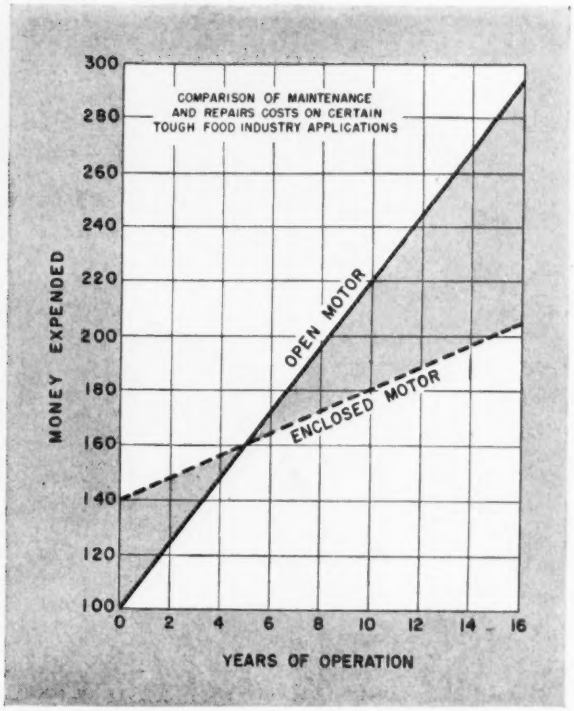
COMPACT G-E CONTROL EQUIPMENT is delivered pretested and factory assembled for easy installation. Operation of these grinders is virtually automatic.

*Reg. Trade mark of General Electric Co.



PROPER MOTOR SELECTION can mean long-term savings. Let G-E engineers show you where the Tri-Clad dripproof motor can do the job or where the enclosed motor should be used.

EVEN LONGER MOTOR LIFE provided by the new Tri-Clad '55' line of gear, dripproof and enclosed motors. A new bearing and grease system greatly reduces maintenance.



YOU SAVE MONEY with the proper motor enclosure. Under tough conditions, in spite of its lower initial cost, an open motor may cost more in the long run than a totally enclosed.

pay off under all operating conditions

"We have experienced long dependable service and low maintenance costs with General Electric drives"—Rockwood Operations Manager

"G-E motors and control are used throughout our plant," says W. E. Ivory, Operations Manager of Rockwood Chocolate Company's big Brooklyn plant, "and we have yet to find an application where they cannot perform the duty." Operating in temperatures ranging from 60° F to 110° F, these G-E drives are giving Rockwood long-term savings.

In Rockwood, as in many food processing plants across the nation, Tri-Clad* motors are giving manufacturers extra years of dependable service. Now, in the first complete redesigning in almost fifteen years, G-E product engineers have developed the new Tri-Clad '55'* motor. This revolutionary motor has all the advantages of the G-E motors installed at Rockwood plus many other significant benefits for the food industry. *Up to 30% lighter and 50% smaller, the new motor has a greater resistance to moisture and improved bearing lubricants. And its greater efficiency gives you higher full-load speed, less power loss.*

G-E application engineers can save you money by helping you select the proper motor enclosure for the specific conditions in your plant. They can determine which of your operations can use open motors, as shown here at Rockwood, and which operations may best be performed by totally-enclosed motors. Although the initial cost of an enclosed motor is slightly higher, its significantly lower maintenance cost may mean long-run economy for you in your tougher applications.

The new Tri-Clad '55' motor is just one of the many electrical components developed by G-E engineers that can prove valuable to you. When planning your next electrical system take advantage of G.E.'s wide experience. Contact your nearest Apparatus Sales Representative or write for Bulletins GEA-6013 on Tri-Clad '55' dripproof or GEA-6012 on Tri-Clad '55' enclosed motors. Section 652-16, General Electric Company, Schenectady 5, New York.

Engineered Electrical Systems for Food Processing Plants

GENERAL ELECTRIC

For more information, use coupon on page 181.

It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature Automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

312 WILSON, SO. NORWALK, CONN.

LT-30 cork covering . . . *a new kind of pipe insulation for dual temperature lines*

Here's a brand-new insulation that offers the high efficiency, strength, and long life of molded cork covering, yet can be installed at much lower cost.

This new material, LT-30 Cork Covering, is fabricated from precision-cut sections of Armstrong's Corkboard, bonded to a special three-ply vaporproof paper. It's used on dual temperature air-conditioning lines, chilled water, and other cold lines. LT-30 prevents sweating under normal conditions where liquid temperatures in the line are 30° F. or above. On hot water cycles, it withstands temperatures up to 200° F.

Application is fast and easy. Simply apply LT-30 Adhesive to an overlap, hold the covering around the pipe, and press the lap in place.

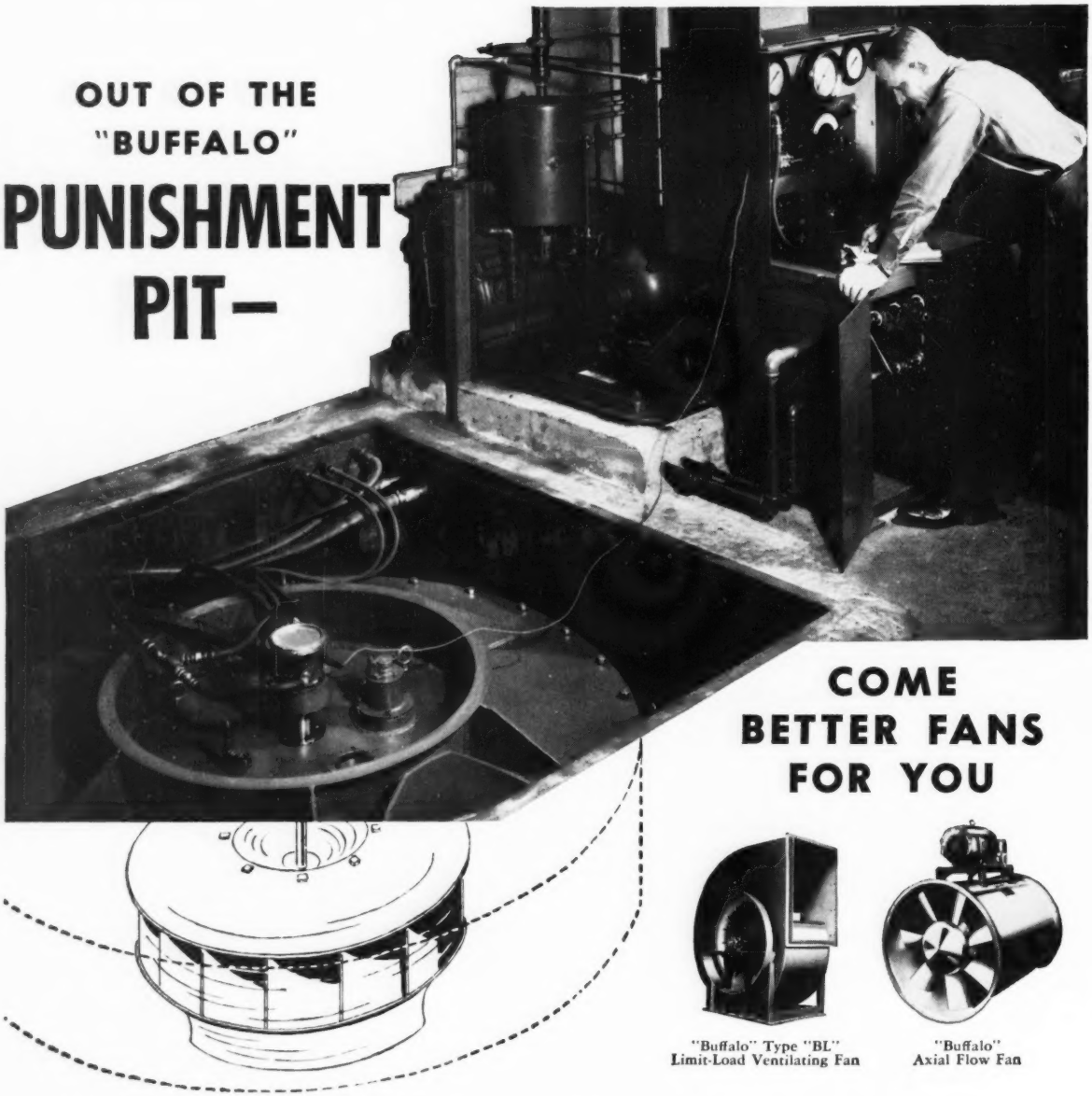
LT-30 Cork Covering is another product of Armstrong's continuing efforts in the laboratory and in the field to improve insulation materials and application methods. For further details on LT-30 Cork Covering, as well as on Armstrong's regular line of molded cork covering, and other industrial insulations, call your nearest Armstrong office or write Armstrong Cork Company, 202 Stratton Street, Lancaster, Pennsylvania.

After the covering is wrapped around the pipe, joints are sealed by strips of LT-30 Paper. There is no need for a further indoor finish, but where color identification is desirable, Armstrong's Insulcolor may be applied.

ARMSTRONG'S INDUSTRIAL INSULATIONS

OUT OF THE "BUFFALO"

PUNISHMENT PIT—



COME BETTER FANS FOR YOU

"Buffalo" Type "BL" Limit-Load Ventilating Fan

"Buffalo" Axial Flow Fan

• To be sure that "Buffalo" rotors can stand far greater stress than they would ever encounter in an installation, we deliberately try to destroy them in this "Buffalo" vacuum test pit! Here, in a partial vacuum, the rotor to be tested can be revolved at tip speeds as high as 60,000 and even 70,000 feet per minute. The slightest unbalance, the slightest structural weakness, would result in destruction of the rotor at these fantastic speeds — and it shows up here in the Punishment Pit, not in the installed fan.

This is just one phase of the rigid testing and excellence of engineering, or "Q" Factor*, which assure you of a best buy when you specify "Buffalo" Fans. Why not write for "Buffalo" engineering literature on *your* air handling problem?

**The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

152 MORTIMER STREET BUFFALO, NEW YORK

Publishers of "Fan Engineering" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

VENTILATING PRESSURE BLOWING AIR CLEANING COOLING AIR TEMPERING HEATING INDUCED DRAFT FORCED DRAFT EXHAUSTING

HAVE YOU SEEN THIS NEW WEAR·EVER ALUMINUM Tote Box?

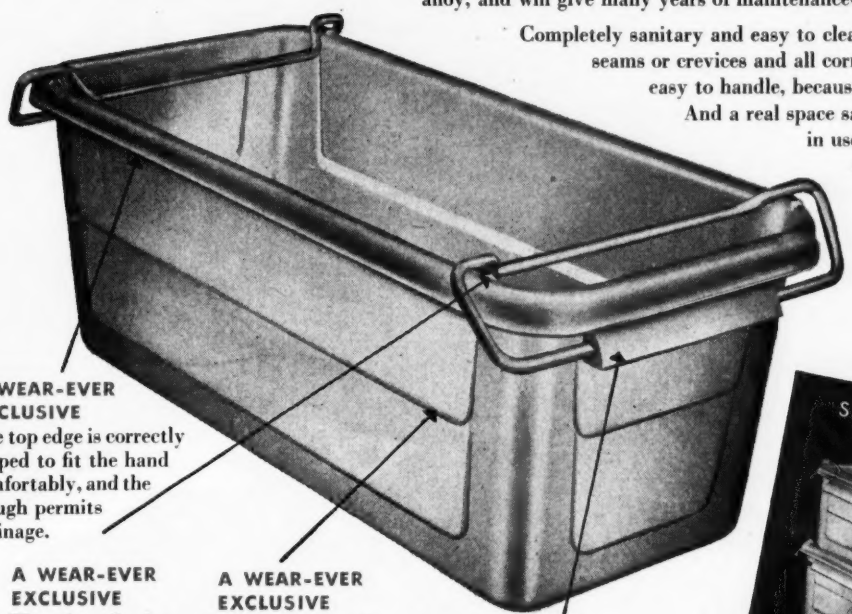
No other food transport container gives you all these features:

This is the only transport box of its depth (12 inches) that is drawn seamless from a single sheet of metal. Yet it is made of extra tough, heavy-gauge aluminum alloy, and will give many years of maintenance-free service.

Completely sanitary and easy to clean because there are no cracks, seams or crevices and all corners are rounded. Light to lift, easy to handle, because it's made of *aluminum* alloy. And a real space saver because it not only stacks in use, but nests when empty. Mail coupon today for a Wear-Ever representative to call and show you this amazing new tote box.

Inside top measures
13½" x 32"

Inside bottom measures
11" x 29½"



A WEAR-EVER EXCLUSIVE
The top edge is correctly shaped to fit the hand comfortably, and the trough permits drainage.

A WEAR-EVER EXCLUSIVE
Wearing Strips brazed on top rim where handles rest.

A WEAR-EVER EXCLUSIVE
For extra strength, double embossing on sides and ends, triple debossing on the bottom.

A WEAR-EVER EXCLUSIVE
One long handle bracket (instead of two). Greater strength, is easier to clean.

WEAR·EVER Aluminum
Standard of Quality for more than 50 years
WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

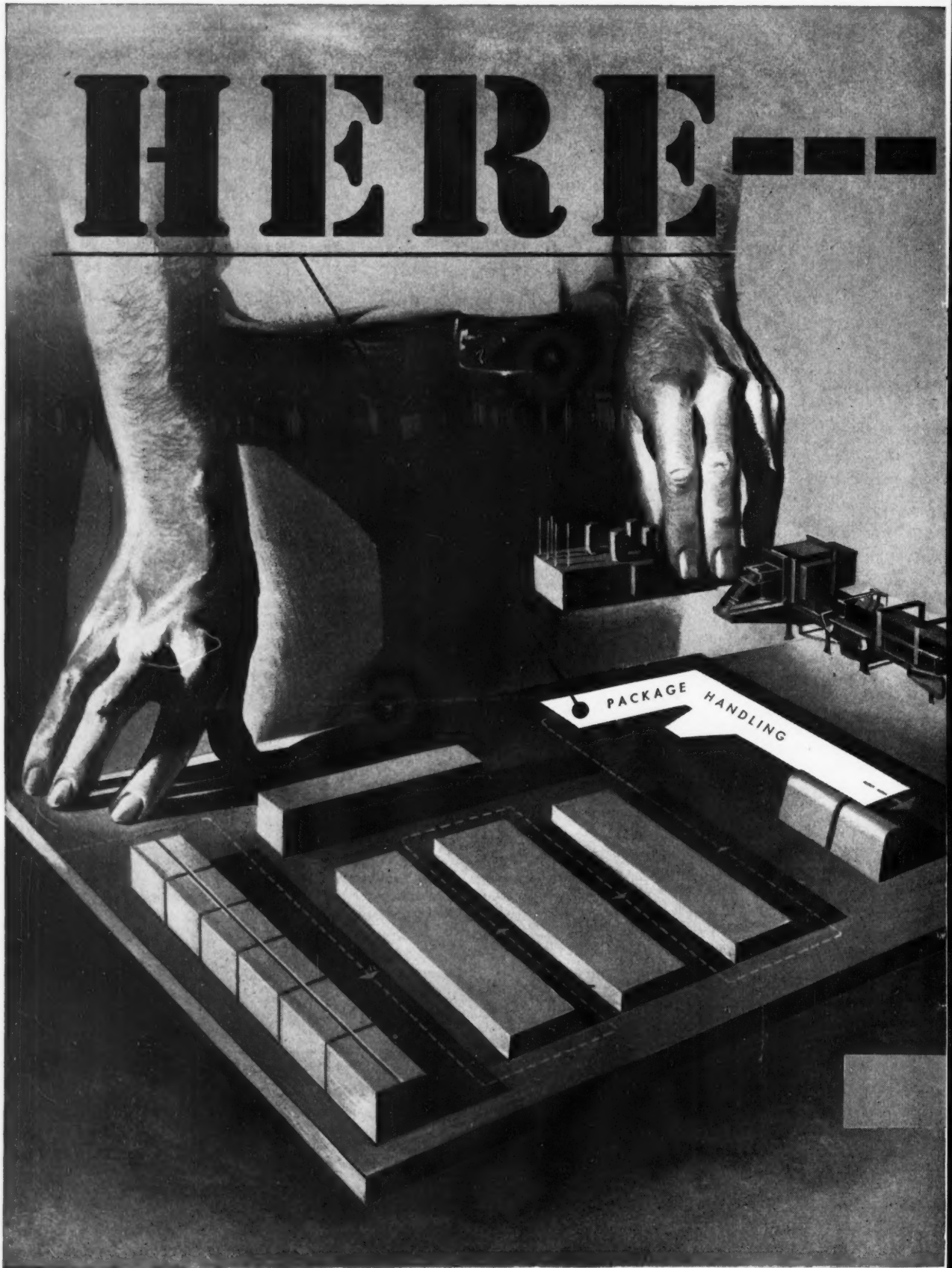
The Aluminum Cooking Utensil Company, Inc.,
306 Wear-Ever Bldg., New Kensington, Pa.
Please have a representative call and show us your new tote box with its exclusive features.

NAME .....

TITLE .....

Fill in, clip to your letterhead and mail.

For more information, use coupon on page 181.



For more information, use coupon on page 181.

WHERE COSTS ARE HIGHEST---

STANDARD-KNAPP SAVES YOU MOST

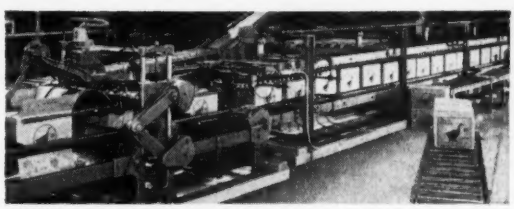
First, we don't waste your time in getting down to essentials. Our engineers talk your language, quickly understand your requirements and accurately interpret them in terms of package handling equipment.

The next point of savings is in the price of the equipment itself. We have a broad and versatile line of standard models and long experience in adapting them to specific requirements. You get a "customized" installation at the lowest possible cost.

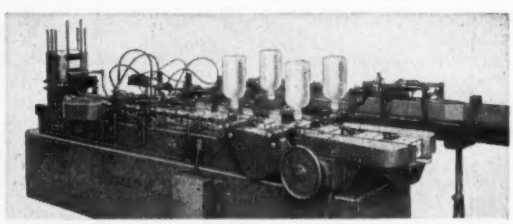
Next, we save you time in realizing the benefits from Standard-Knapp equipment. We train your operators, get them to know and like the machines, provide them with easy-to-read operating instructions.

Then, you can count on a strategically located service organization for prompt and competent assistance in keeping Standard-Knapp equipment at full efficiency.

To save most where it counts the most, call in Standard-Knapp – whether you need a complete line of packaging equipment or a single machine.



ADOPTION OF FIBRE CASES by citrus fruit industry was expedited by gluing and sealing equipment developed by Standard-Knapp. Another instance of S-K's ability to engineer packaging equipment for maximum savings and efficiency.



SIX-PACKS HIT JACKPOT in popularity with beer consumers. Carton inserter (above) is key machine in line of equipment developed for brewing industry by Standard-Knapp. New line handles cans at rate of 500-600 per minute.

EMPTY CAN PALLETIZING SYSTEM devised by Standard-Knapp speeds and simplifies delivery of empty cans to user, expedites introduction of cans into filling and processing lines. Another example of Standard-Knapp pioneering in better packaging methods.

IN PACKAGING-- *STANDARD-KNAPP EQUIPMENT IS AUTOMATICALLY MORE EFFICIENT*

STANDARD-KNAPP

DIVISION OF EMHART MFG. CO.

PORTLAND, CONNECTICUT

For more information, use coupon on page 181.

These users get all of from FOAMGLAS®

Ceilings

CLARION FROZEN FOOD LOCKERS, Clarion, Pa., chose FOAMGLAS insulation for ceilings, walls and floors to assure constant temperature control in both their deep-freeze locker-room and their cooler where they chill and age animal carcasses. Lightweight, easy-to-handle for ceiling installations in all types of refrigerated structures, FOAMGLAS provides a firm, incombustible insulation with lasting effectiveness.

● FOAMGLAS stays dry

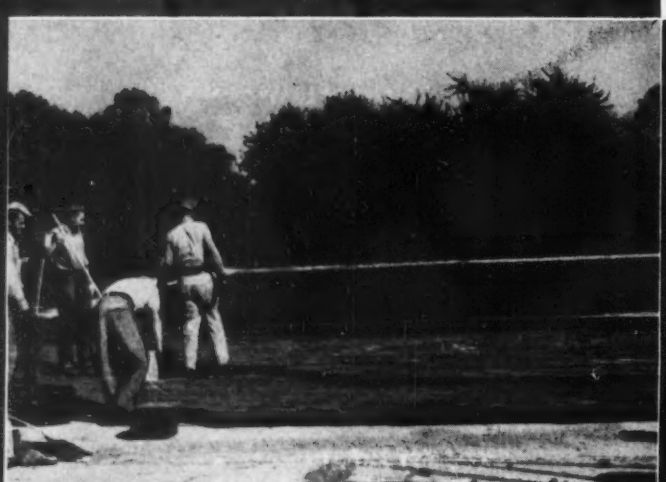
The sealed glass cells of FOAMGLAS are inherently waterproof . . . effectively resisting moisture absorption and the transmission of water vapor.

● FOAMGLAS can't burn

The fact that this cellular glass insulation is completely non-combustible is an important safety factor for all types of construction.

● Rot and vermin proof

FOAMGLAS is inorganic . . . will not rot or deteriorate and provides no food or nesting materials for rats, roaches or other pests.



Roofs

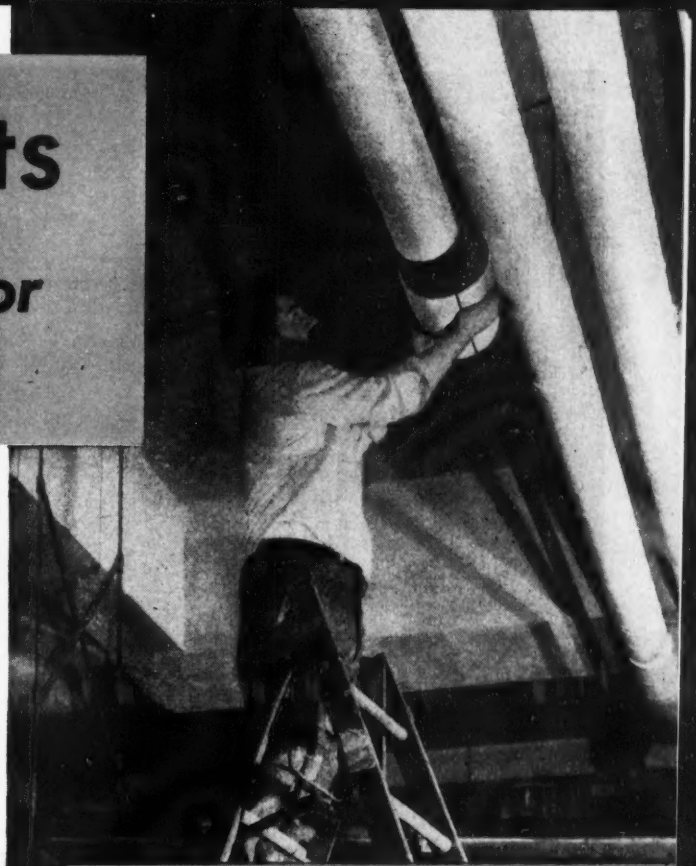
STADLER PACKING COMPANY, Columbus, Indiana, used FOAMGLAS to insulate the roof as well as the walls and floors of their two story hog processing building. They found that FOAMGLAS helped insure constant operating temperatures of minus 5° F. to plus 38° F. in their cooler rooms. Its rigid, waterproof cellular glass structure assures a long, trouble-free life for their roof.

Walls

PET DAIRY COMPANY, Columbia, S. C., reports "FOAMGLAS has an ideal combination of properties for our low temperature installation . . . its waterproofness is most important, and we benefit also from its high compressive strength, incombustibility and resistance to rot and vermin." In this photo FOAMGLAS walls are being erected in Pet's ice cream hardening room where floor and ceiling were also insulated with FOAMGLAS.

these benefits

the ideal insulation for low temperatures



● Long-lasting insulation

Lightweight, but strong and rigid, FOAMGLAS *retains* its original insulation value . . . gives long, maintenance-free service on floors, walls, ceilings, roofs, piping and equipment in refrigerated structures.

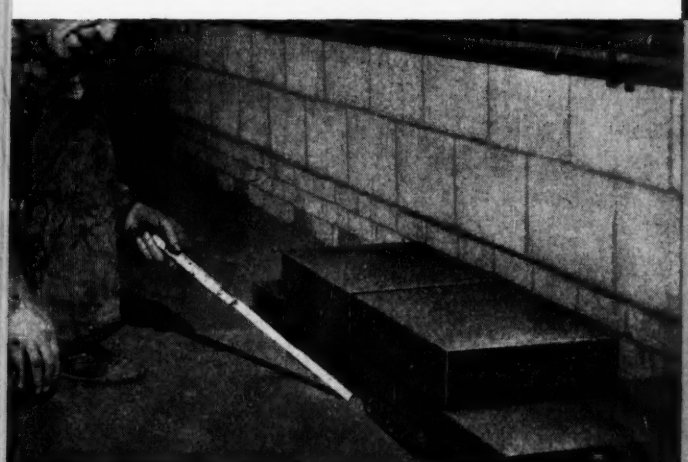
WRITE FOR THESE BOOKLETS TODAY!

Write us now for these booklets which are packed with the information about FOAMGLAS, indicating whether you are interested in insulation for refrigerated structures, piping or equipment. Address Department 0-64...

PITTSBURGH CORNING CORPORATION

One Gateway Center • Pittsburgh 22, Pa.

Piping PITTSBURGH BREWING CO., Pittsburgh, is using Pittsburgh Corning's newest product, aluminum-jacketed FOAMGLAS pipe insulation, because it gives them a low-cost combination of water-proof, fireproof FOAMGLAS and an attractive, easy-to-clean aluminum finish. They saved costly steps in application, jacketing, fastening and finishing by using aluminum-jacketed FOAMGLAS.

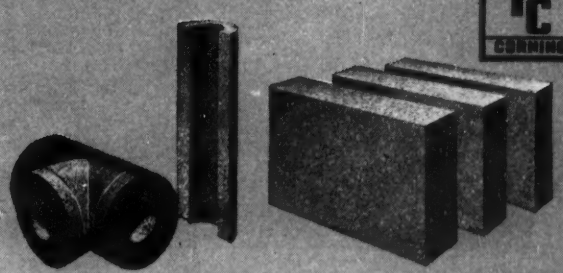


Floors LUICK ICE CREAM CO. (Milwaukee Div. of National Dairy) found the high compressive strength of FOAMGLAS, able to bear the weight of a concrete floor and roof-supporting columns, allowed them to construct their new hardening room within the existing structure. This saved two months time and the cost of floor excavation or additional exterior construction. Warm air blown through open channels (see photo) prevents frost accumulation.

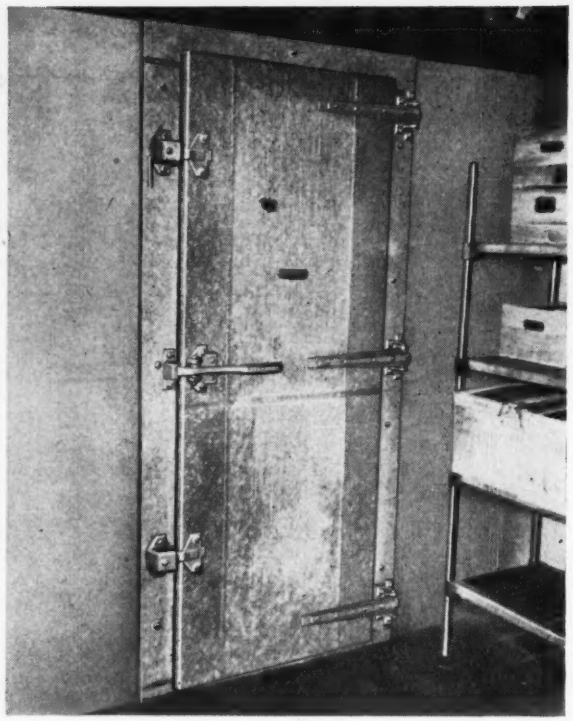
FOAMGLAS®

the cellular, stay-dry insulation

PITTSBURGH PC CORNING



Pittsburgh Corning also makes PC Glass Blocks



For Applications Down To −20° F.

Select JAMISON LO-TEMP Doors for Efficiency and Economy

For any low temperature application where an infitting door will best serve your purpose—down to −20°F.—the perfect door is a JAMISON LO-TEMP. It is an efficient infitting door, equipped with super-safe single seals, E-Z Open fasteners that maintain a tight seal but open with minimum effort with lever handle, and positive action Adjustoflex Hinges—stainless clad or Standard, woodback galvanized face. They work better, look better, stand up longer. For complete information, specifications and dimensions, write for Catalog Section 3, Jamison Cold Storage Door Company, Hagerstown, Maryland.

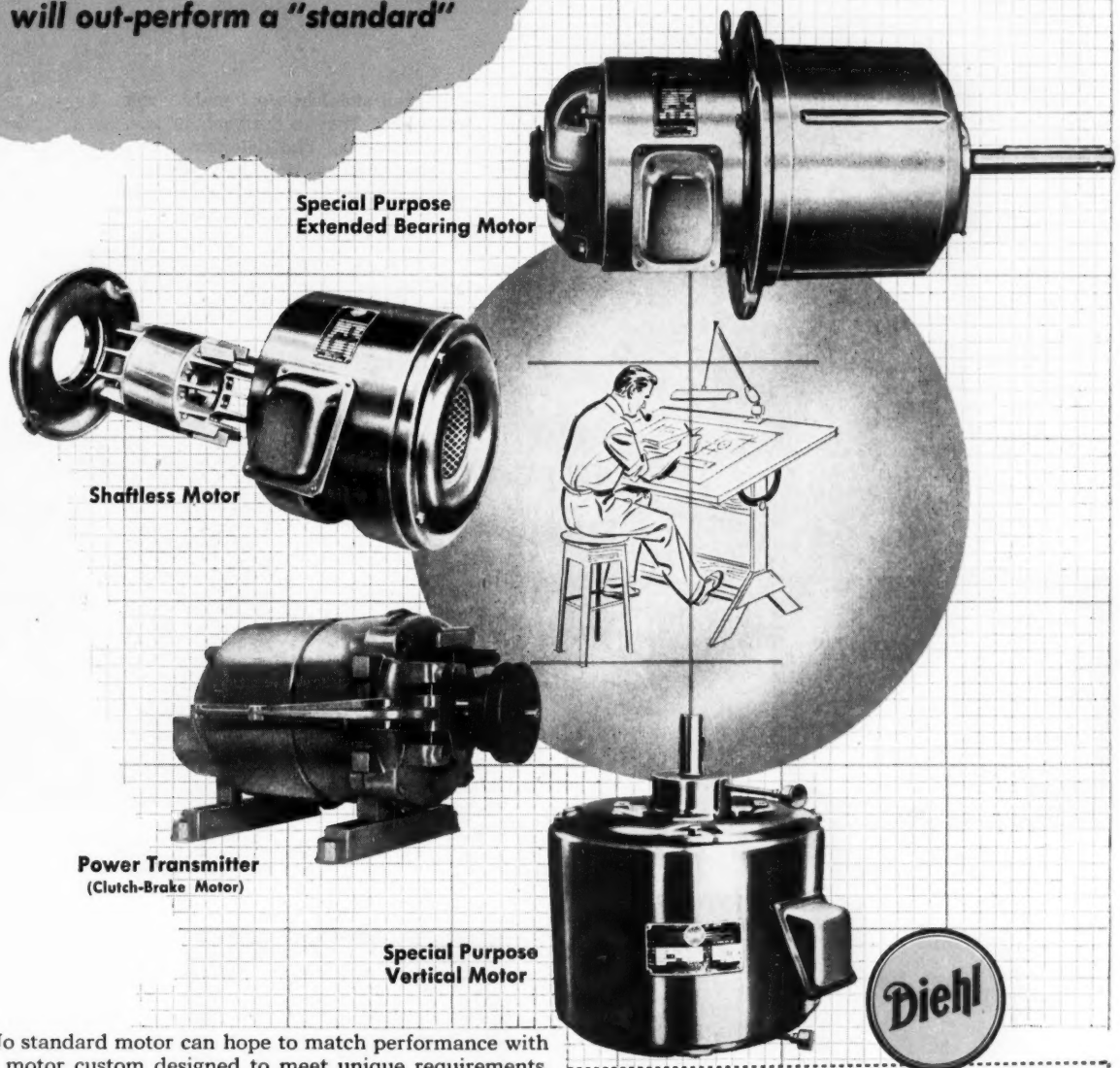
JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

a motor designed for its job

will out-perform a "standard"



No standard motor can hope to match performance with a motor custom designed to meet unique requirements.

That's why Diehl lays so much emphasis on custom construction . . . why, through the years, it has geared its abilities and its facilities, its design, engineering and manufacturing functions for maximum cooperation with its customers . . . whatever the application.

DIEHL custom-tailored motors can:

Cut costs • Save space • Reduce weight • Improve safety
Simplify design • Speed production • Improve appearance

When you want a fast, thorough answer to an unusual motor problem it will pay you to consult Diehl. Name your conditions . . . Diehl will design and build to match.

DIEHL MANUFACTURING COMPANY
Electrical Division of THE SINGER MANUFACTURING COMPANY
Finderne Plant, SOMERVILLE, N. J.

Please send me the following bulletins:

☐ New Type "D" Motor Bulletin No. FE 3304
☐ Consolidated Catalog & Price List No. FE 3310

Name_____

Company_____

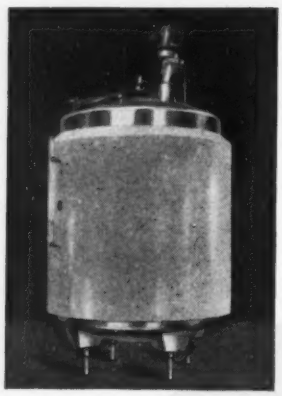
Street_____

City_____ State_____

INTEGRAL AND FRACTIONAL HORSEPOWER MOTORS ARE AVAILABLE IN A WIDE RANGE OF TYPES AND SIZES

For more information, use coupon on page 181.

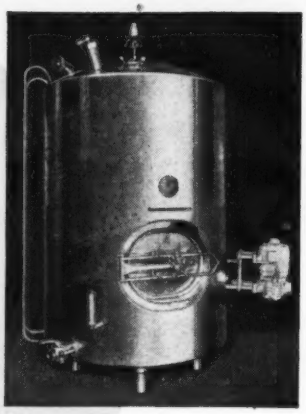
Your Product... Your Process...
Your Space design Cherry-Burrell
CUSTOM-BUILT STAINLESS STEEL TANKS

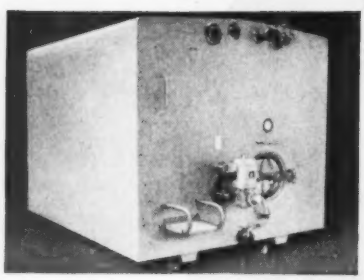


As you see, Cherry-Burrell stainless steel tanks *don't* look alike and *aren't* alike. They're custom-built . . . designed to *your* specifications. *You* determine their size, their shape . . . *your products* determine whether the tank you buy will heat, cool; heat and cool; or hold temperatures. Propeller or air agitators available.

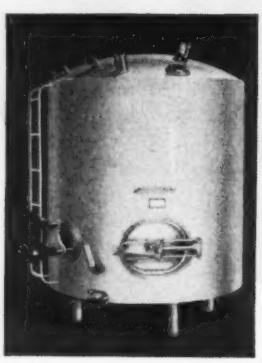
Your Cherry-Burrell representative can help you with your bulk liquid handling problems. Call him or clip coupon for full details.

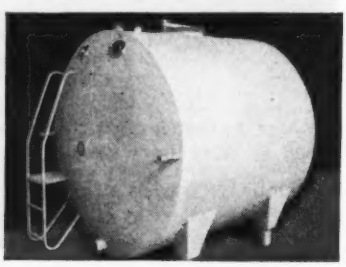
CHERRY-BURRELL TANKS HANDLE





Beer	Fruit Juice
Blood	Lard
Buttermilk	Margarine
Champagne	Mayonnaise
Chemicals	Milk
Cider	Oils
Coffee	Pharmaceuticals
Cosmetics	Sugars
Cream	Syrups
Eggs	Water
Fats	Whiskey
Flavors	Wine





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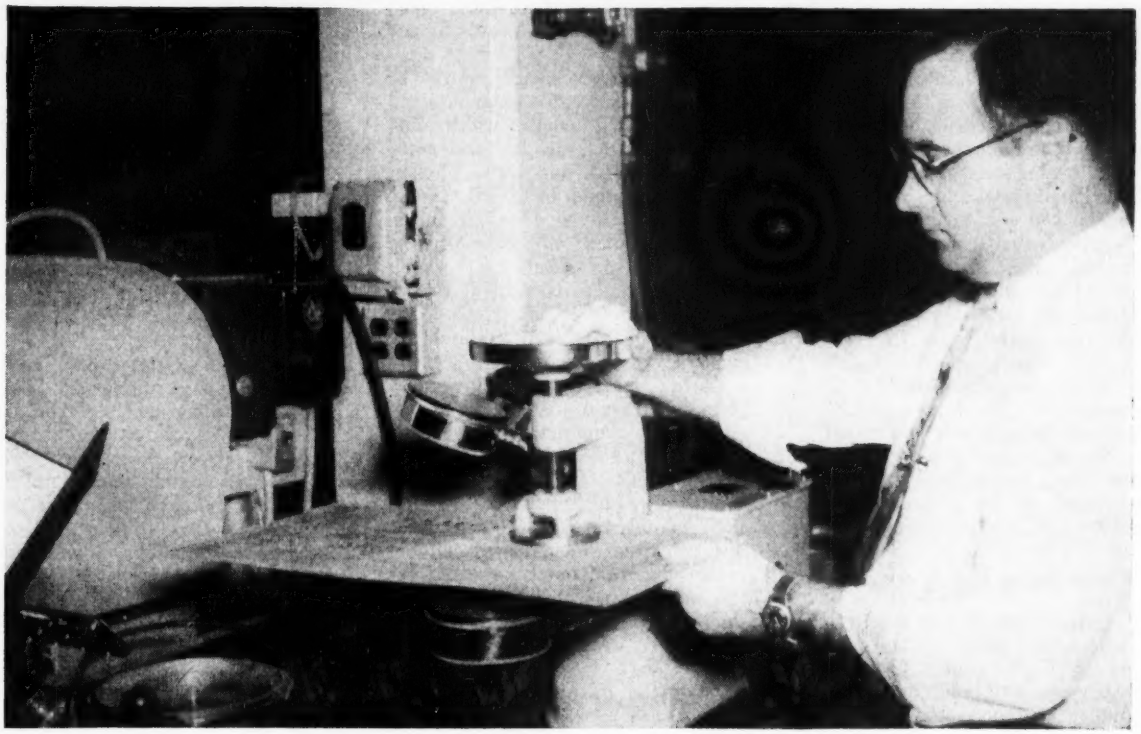


ADHERENCE of your cartons and shipping cases to well-thought-out specifications is best checked with the latest paper-testing equipment. Here, for example, bursting strength of a paperboard sample, drawn from incoming lot, is read on standard Mullen device at Kraft Food Co.'s package-testing laboratory.

More "What-to-Do's" When—

Checking Packaging Supplies

Tips to assure arrival of uniform-quality cartons and shipping cases that handle easier and faster on manual- or machine-operated lines

FE STAFF

Today's top-speed packaging lines comprise a succession of machines, each with a rated, per-minute-output of packaged foods. And, true enough, one or more of the machines sometimes will fail to maintain production rate, either due to minor operating difficulties or complete breakdowns.

But—machines are only part of the cause for line slow-downs or stoppages. Often overlooked, yet almost equally important, is the quality of packaging materials fed to high-speed lines equipped with automatic machines. For, if out-of-spec materials go to such lines, costly stoppages occur.

Only by setting up specifications and making certain supplies rigidly adhere to them will a well-maintained packaging line operate at 100% efficiency.

This article, therefore, picks up on the discussion on sampling and inspecting of glass containers (FE May '54, p. 79) and provides working details on checking adherence of plain cartons, display cartons, and shipping cases to specifications.

Carton "Specs"

Printed cartons should conform to dimensional tolerances set up on an accompanying drawing and "spec" sheet. And the defects (major, medium, and minor) must be within what is specified in the statistical sampling plan.

Cartons covered by these specs must be suitable for immediate use on automatic cartoning machines.

To conform to dimensional tolerances, length, width, and height of cartons, as well as length and width of flaps and tucks, should be checked with a rule (1/32-in. divisions). Allowable are ± 1/64-in. tolerances, unless otherwise noted on drawing or spec sheet. Too, board thickness should be accurately checked with the aid of a micrometer.

Those cartons exceeding allowable

dimensional tolerances must be considered as having major defects and, accordingly be judged unacceptable.

Board stock must bend well and, when scored, withstand folding, through 180 deg. in the direction from which it is creased, without visible cracks or fractures on outer surface.

Board not meeting this requirement may be considered in the major-defect category and unacceptable.

In testing for proper scoring, the four longitudinal scores should be pre-broken 180 deg. to make certain that they are sharp, well defined, and aligned with knife cuts. Scoring should be uniform and just deep enough to prevent surface breaks in the paperboard when the carton is creased, filled, or closed.

As for die cutting, knife cuts must be clean, free from nicks, and in register with printing and decoration.

Those cartons not pre-broken 180 deg. along longitudinal scores may be classified in the minor-defect group and judged unacceptable.

About Gluing and Printing

It is important that cartons be securely glued along the full length of the flap. What's more, flaps must not separate at any point during opening and tucking on automatic cartoning machines. Glued flaps must conform with these requirements for at least 12 months' storage.

There should not be too much glue on flaps, for then the inside of the flap may stick to the opposite carton wall. Moreover, cartons must not "form out of square" as a result of irregular folding and gluing.

Defects in gluing may be rated major, and cartons unacceptable.

When specified, printing and varnish coating should be examined visually for scuffs, scratches, blemishes, registry, fuzziness, non-uniformity of coverage, incorrect copy and design, and poorly defined edges on printed areas.

Ink colors must comply with specs set up in a specification sheet or purchase order, with assurance that they are within indicated photospectometer tolerances.

Printing defects may be considered minor ones, nevertheless unacceptable.

Lastly, plain cartons must adequately be protected from contamination and damage during normal handling, shipping, and storing. Nonconformance to specific case markings and packing (according to spec sheets) may be judged minor defects and unacceptable.

Now let's consider plain or printed display cartons, including dividers and parts, when specified, that must also conform to dimensional tolerances set up in a drawing and specification sheet.

These must be suitable for manual or machine setting up, packing, and closing operations. Too, these materials should be clean and ready for use upon delivery.

Dimensional tolerances must be checked similarly to aforementioned plain cartons. Length, width, and height of carton, divider, and parts, as well as length and width of flaps and tucks, should be gaged. Tolerances of $\pm \frac{1}{64}$ in. are allowable, unless otherwise noted in accompanying drawing and spec sheet.

Dividers and parts must fit carton, without binding or being too loose. Similarly, board thickness should be checked with a micrometer.

Cartons and parts exceeding allowable dimensional tolerances may be rated in the major-defect category and considered unacceptable.

Like plain cartons, board stock must bend easily and, when scored, withstand folding, through 180 deg. in the direction from which creased, without visible cracks on outer surface. Stock for non-folding parts and dividers should be rigid, unless otherwise indicated.

Board Stock Requirements

Board not meeting these requirements is in the unacceptable, major-defect group.

As with plain cartons, scoring must be well defined and aligned with knife cuts. Scoring should also be uniform and deep enough to avoid surface breaks on paperboard during creasing, setting up, packing, and closing of the carton.

Too, knife cuts should be clear, free from nicks, and register with printing and decoration. Dividers must be clear-cut, stripped, and assembled, and they should open easily to form straight-walled, square-cornered nests.

Defects in this category are of an unacceptable minor nature.

Cartons and glued parts must be securely sealed along full length of glue flap. There should be no separation when carton is opened or closed. Glue flaps must fulfill this requirement for at least 12 month's storage.

Also, cartons must be checked for excess glue on flaps and to make certain that they do not form out of square.

In the case of machine handling, gluing defects are judged unacceptable major ones. For hand-packing, they are of a minor, unacceptable nature.

Printing and varnish coating as well as ink colors are checked in the same manner as for plain cartons. And defects are classified similarly.

Cartons, dividers, and parts must be separately packed in corrugated shipping cases as a safeguard against contamination and damage. If not, then a minor defect should be scored and there should be rejection.

Examining Shipping Cases

Shippers must conform to established dimensional tolerances in the same way as plain and display-type cartons. This includes, when specified, liners, dividers, and parts. All must be suitable for manual and machine setting up, packing, and closing operations. Only addition is checking flute and thickness of board with the specifications.

Corrugated material must meet bursting-strength requirements. Top and bottom facing sheets should be securely glued to corrugation and over all contact surfaces. Bases, liners, and parts must not separate when formed. Corrugations and facings must be even.

Defects may be rated as minor ones and cases unacceptable.

Scoring and die cutting should be checked in the same manner as plain and display cartons. In addition, flaps must be square cut and must not overlap when cases are set up.

Defects in this category may be considered minor and cases unacceptable.

Looking for Defects

Unless otherwise specified, shippers should be securely bound with 2-in. cloth tape and along full length of corner joints. Tape must not run below nor extend above the case. There should be no separation between ends of shipper along bound length. And finished cases must not form out of square.

Binding defects may be considered minor ones and cases unacceptable.

Printing should be clean-cut and non-smeared. It should be examined for defects in registry, blemishes, non-uniformity in coverage, and in correct copy and design.

Color or printing defects may be judged minor and cases unacceptable.

Shippers must meet minimum requirements of Rule 41 of the Consolidated Freight Classification. Those not conforming are in the major-defect group.

Cases, liners, and parts must be separately tied in bundles with twine. Amount per bundle, identification, etc., must be specified. Shipment must be such as to assure safe, undamaged arrival.

Non-conformance may be considered in the unacceptable, minor-defect category.

FDA Inspection *Re-Weighed*

¶ Industry stands to benefit by reports ¶ "Reasonable time" evaluated
¶ Points on how to comply ¶ FDA in consulting capacity?

EDWARD L. HOLMES
Executive Director, American Sanitation Institute, St. Louis

Over a year ago, a food processor went to the highest judges in the land to appeal his prosecution for refusing permission for a check of his plant by an FDA inspector.

Ruling of the Supreme Court was that this refusal was his privilege under the language of the Federal Food, Drug & Cosmetic Act of 1938, as it was originally written. Thus this conviction was set aside.

As a result, there was wide publicity that the FDA no longer had authority to prosecute firms or individuals for refusing permission for inspections. Such publicity also emphasized that inability to make mandatory inspections might prevent proper enforcement of the Act within plants suspected of insanitary conditions.

A bill of amendment then was introduced into Congress providing FDA with authority to prosecute a firm or individual for so refusing to permit inspection. And this measure was signed by the President and became law in August.

More Light on Findings

However, this amendment also contains added provisions that work for better protection of the food industry —making for more knowledge of the inspector's findings than in the past. It provides that the inspector must report his findings, in writing, to the management of the plant. And if he collects samples, then he must give management the opportunity to collect identical ones. And FDA ultimately must submit to the firm a complete analysis of samples collected from the plant.

In the later instance, these are not the official samples from interstate commerce that might later be collected for regulatory action. Instead, they are investigational samples that the inspector picks up as part of his factory-inspection evidence.

A penalty was provided for violating the Act—in refusing to permit inspection. But at the same time there also was set up the privilege of management to refuse (on the basis of not considering the time reasonable).

Surely, if the Act gave the right of such choice of management, then it would not be proper to penalize for exercising that right.

Thus there has been considerable confusion in the industry as to the meaning of the Supreme Court decision. It has been implied that the Court decided it was not right for the government to have been given authority to make an inspection. Obviously, this was not the case. The amended Act definitely requires inspection permission.

Language of Amended Section

Chapter 3 of the Act remains the same—specifying violation in refusing to permit inspections as authorized by the new Section 704 and the penalties. However, Section 704 now has been changed, the law reading as follows:

Sec. 704. (a) *For purposes of enforcement of this Act, officers or em-*

Turn page→

This kind of insanitation . . .

WHEN an FDA inspector spots raw materials stored in this insanitary fashion, then he's almost certain to come up with evidence of rodent contamination, insect infestation, or both.

ployees duly designated by the Secretary, upon presenting appropriate credentials and a written notice to the owner, operator, or agent in charge, are authorized (1) to enter, at reasonable times, any factory, warehouse, or establishment in which food, drugs, devices, or cosmetics are manufactured, processed, packed, or held, for introduction into interstate commerce or are held after such introduction, or to enter any vehicle being used to transport or hold such food, drugs, devices, or cosmetics in interstate commerce; and (2) to inspect, at reasonable times and within reasonable limits and in a reasonable manner, such factory, warehouse, establishment, or vehicle and all pertinent equipment, finished and unfinished materials and containers, and labeling thereon. A separate notice shall be given for each entry made during the period covered by the inspection. Each such inspection shall be commenced and completed with reasonable promptness.

(b) Upon completion of such inspection of a factory, warehouse, or other establishment, and prior to leaving the premises, the officer or employee making the inspection shall give the owner, operator, or agent in charge a report in writing setting forth any conditions or practices observed by him which, in his judgment, indicate that any food, drug, device, or cosmetic in such establishment (1) consists in whole or in part of any filthy, putrid, or decomposed substance, or (2) has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health. A copy of such report shall be sent promptly to the Secretary.

(c) If the officer or employee making such inspection of a factory, warehouse, or other establishment has obtained any sample in the course of the inspection, upon completion of the inspection and prior to leaving the premises he shall give the owner, operator, or agent in charge a receipt describing the samples obtained.

(d) Whenever in the course of any inspection of a factory or other establishment where food is manufactured, processed, or packed, the officer or employee making the inspection obtains a sample of any such food, and an analysis is made of such sample for the purpose of ascertaining whether such food consists in whole or in part of any filthy, putrid, or decomposed substance, or is otherwise unfit for food, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge."

Reasonable Time for Inspection

This new section, obviously, gives no choice to management. Inspection must be permitted upon presentation of written notice to owner, operator, or agent in charge. Emphasis, however, is upon the term "resasonable times" and this, of course, is where difference of opinion might arise. Unless the period of inspection entails considerable hardship upon the firm, it would be foolish, in the writer's opinion, for anyone to exercise the privilege of stating that the inspection was not being asked for at a reasonable time.

Obviously, no food manufacturer wants an inspection unless the manager or responsible person in charge of that particular area is present. But such a person also must be reasonable in making himself available to accompany the inspector, unless a mutual agreement can be made on a postponement.

If, for instance, management is not available when the inspector makes his first request, then it is, in the writer's opinion, reasonable to expect that a time be set when management will be. The point is that the inspection must be permitted, and as quickly as possible under reasonable conditions.

In present actual practice, FDA is meeting the notice-giving requirement by supplying the inspector with a form for filling out and submitting to management. This form provides for naming the person to whom it is to go and his title, and indicates that an inspection is to be made at that time.

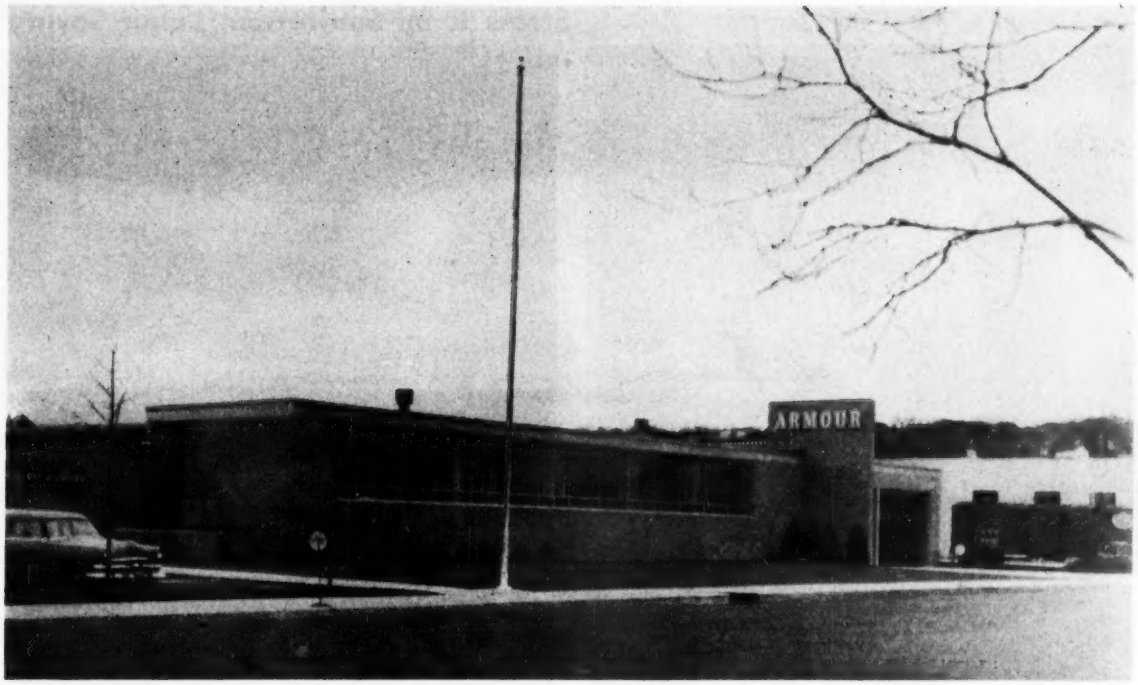
It should be noted, however, that such notice is not required for repetitions of the same inspection. In other words, if the inspector leaves for lunch, he has the privilege of coming back without submitting a new notice. Or

(Turn to page 213)

. . . quickly leads to tell-tale evidence

PROOF: Pint of flour, collected from a bakery hopper and screen-sifted, showed these insects.

MORE PROOF: Profusion of insect trails detected in flour-dust coated bakery equipment.



SINGLE-STORY branch house sets future pattern. It's a radical departure from less efficient multi-story units.

Outstanding Showplace Plant

Squeezes Utmost From Handling Dollars

Keen analyzing and modern reshaping went into construction of new Armour branch house for speedy, safe, and continuous product flow

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

True, there's something deeply satisfying in working in a spanking, attractive new building. But the beauty of Armour and Company's new ranch-style branch house is far more than skin deep.

Even more beautiful is how top management has fashioned the kind of a branch house it feels will operate right cost-wise and schedule-wise as well as serve as a model for other new company branches.

As President F. W. Specht puts it, "The new branch encompasses all we've learned in the past about handling perishables. And we're going to watch it carefully to find out a lot more in the future about improving operations with these products."

According to branch house Manager S. C. Kalloch and his assistant, J. J. Daley, efficient layout of the building, plus direct service, will enable this branch to provide better service to its customers with about one-half the facilities considered necessary a few years ago.

Today, this spacious branch services the same territory as the former four-story facilities in New Haven and Waterbury. Covered by the Waterbury branch is an area of 60-mile radius inhabited by about 850,000 people.

All On One Level

This single-story branch is built of buff-colored Roman brick. Located on a 200x535x571-ft. tract, it has ample parking space and convenient loading and unloading facilities.

Incoming products are spotted for unloading at a 6-car railroad dock along the southwest side of the building and, at the front end, a transport-truck part of the dock accommodating 4 carriers. Outgoing assembled orders are loaded into five delivery trucks at a time from the spacious, refrigerated, fully-enclosed shipping room on the northeast side.

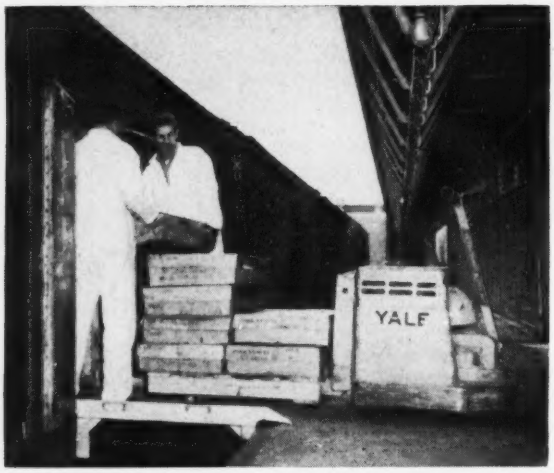
Customers, visitors, and personnel enter the building directly from the parking area, via a side door. And they walk along a hall flanked by modern glass-fronted offices.

Offices are heated by hot water pumped from the boiler house in the rear of the branch. Outside temperatures control a thermo-switch that operates the pump. The offices have acoustical ceilings and recessed lighting.

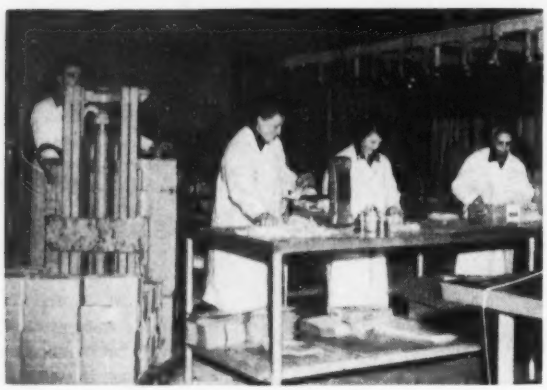
Unimpeded Flow

Before top management settled on its present Waterbury branch house,

DIRECT from reefers, beef, veal, and lamb are mono-railed into well-arranged centralized packing room.



ELECTRIC TRUCK simplifies transfer of pallet loads of various boxed items into coolers and dry storage.



SAUSAGE PRODUCTS are pre-packaged on stainless tables. Fork trucks move palletloads to packing.

PORTABLE TRUCKS carry hanging items and meat loaves to centralized packing area.

it poked around, made a lot of surveys. Outcome was this smartly engineered structure featuring uninterrupted, straight-through, 4-way product flow handling orders for direct service in by-pass fashion on the dock; trucking and railing meats through sausage processing; rail-hanging fresh meats to centralized packing (in the big cooler); and trucking and conveying frozen and cased goods through storage and centralized packing.

Equally impressive is the installation of latest equipment and advanced methods for efficient production of sausage products and for handling of others.

For a sharp picture of the 4-way flow of products, let's follow each in order:

Waterbury handles many direct-service cars and over-the-road trucks in addition to its regular branch house activities. Products going directly to hotels, restaurants, and institutions include variety meats and cuts from fresh beef, veal, lamb, and pork meats.

Meats are directly transferred from these trucks or cars to delivery trucks at two areas on the unloading dock—with only a few feet of lugging or trucking.

Beauty of this system is its simplicity. It abolishes not only costly multiple handling of direct-service goods in the branch but also delays, confusion, and interference with the flow of other products.

Noteworthy about the Armour railroad cars are the specially built, easy-to-clean stainless steel floor racks and gates. Racks are of ½ x 3-in. stainless strips spaced 3½ in. apart and 4 in. off the floor to facilitate cold-air circulation. Gates, of similar construction, are used to separate cased goods from rail stock.

Various Sausage Handlers

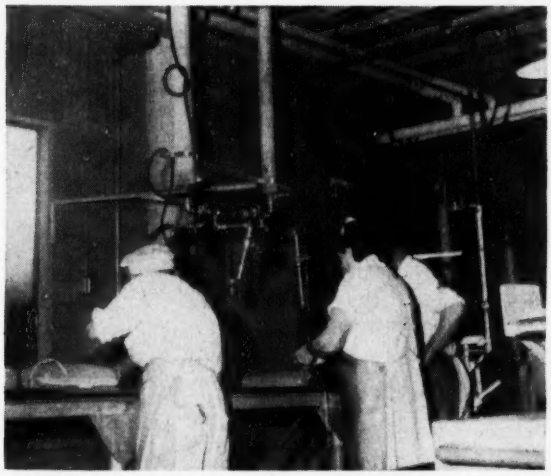
A variety of movers—pallet-electric trucks, portable meat trucks, mono-rail-mounted cages, conveyors, portable shelf- and hanging-type racks, and pallet-fork trucks – carry products through different stages of sausage-meat processing.

Fresh trimmed meats, cut from rail stock in meat-cutting sections in the centralized-packing area, are transferred by portable meat trucks to the grinder in the sausage kitchen.

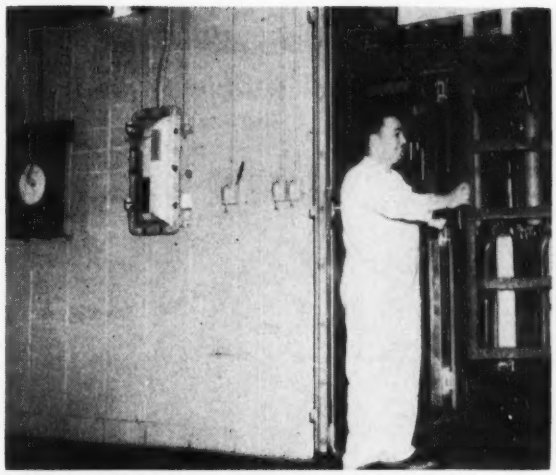
Frozen trimmed meats are handled by pallet-electric trucks directly from brine-refrigerated reefers, over a short, sturdy, removable magnesium alloy ramp, to the dock-side, fin-coil refrigerated (34 deg. F.) cooler. A caged section in this cooler holds pallet loads of various types of casings. From a guillotine-type meat chopper, frozen trimmings go via meat trucks to the grinder in the adjacent fin-coil refrigerated (70 deg. F.) sausage kitchen.

Attractive are the sanitary, easy-to-clean tile floors and pale green tile walls in both sausage kitchen and

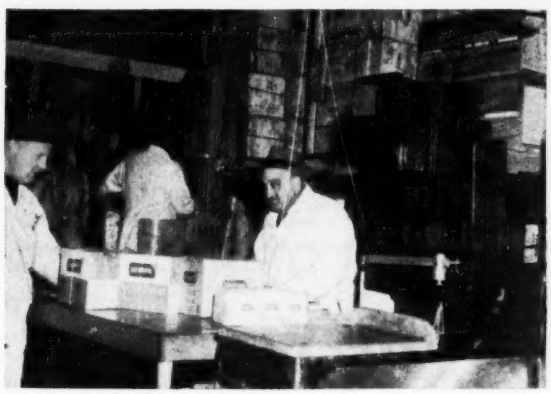
and Straight-Through Product Flow



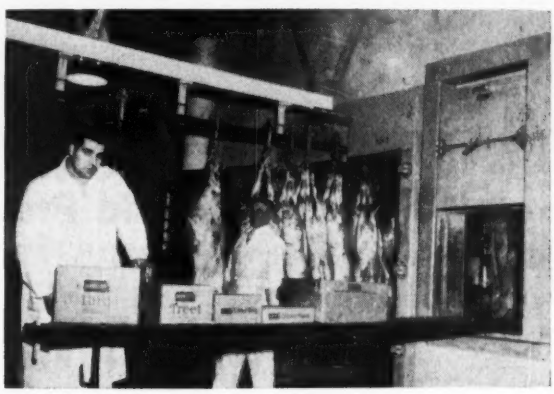
SANITATION gets accent in sausage kitchen. Note full-height tile walls and fin cooling coils (ceiling).



SMOKEHOUSES are single-story and of stainless steel construction with exterior walls of tile.



ORDER-PICKERS assemble the varied lots of meats in the centralized packing room.



BY MONORAIL and roller conveyor, orders come out of packing area into refrigerated shipping room.

adjacent combination smoke-cook room. Portable meat trucks and ingredient tubs are of stainless steel.

In the sausage kitchen are the latest processing equipment. There is a chopper-mixer, horizontal-type batch mixer, two stuffers, and a sausage linker.

Adjacent to the kitchen and near the mixers is the spice-storing-scaling room.

All products are weighed before and after leaving the smoke-cook room as a check on "green" and finished meats. Those going to smokehouses first pass through a partially enclosed, 6-nozzle water spray directly over a floor drain. Water spraying removes loose bits of meat adhering to casings and thus assures more attractive-looking products.

Advanced processing units, arranged for uninterrupted flow of products in the smoke-cook room, include: Two single-story, side-by-side, 6-cage, stainless steel Julian smokehouses with automatic temperature recorders and controllers; a single-cage, stainless Jordan cooker with temperature regulator; a single-cage, 6-nozzle spray-type shower; a partially-enclosed cage washer with nine spray nozzles; a rotary, drum-type stick washer; a pair of 1,000 lb.-capacity stainless steel cookers for boiling hams and loaves; and a stainless steel dip tank for browning meat loaves in hot fat.

More Efficient Cooling

Meat loaves and similar items are trucked directly to the 45-deg. F. sausage-packing room. Products hanging on cages are railed into a 10-cage capacity, pre-chill room (34 deg.) before going into the adjacent sausage-packing room. All rooms are fin-coil refrigerated, except the pre-chill and shipping coolers.

"Advantage of our fin-coil units is that they automatically defrost and the melted ice flows directly into drains without messing up the floors," says branch house Superintendent H. A. Ziemer. "We no longer slop up the rooms as when using hot water to release ice from ammonia-refrigerated pipes."

Another thing; Fin-coil refrigeration was selected for use in rooms other than the pre-chill and shipping coolers because it is noiseless.

The sausage-packing room has a 10-cage area for hanging products and three stainless steel packing tables.

One table, with a center belt conveyor, is for skinless frankfurters. Franks are removed from cages, then fed to an 80-per-min. skinning machine and onto the packing table. Here, with the use of four combination scales and heat-sealers, wieners are packed in 1-lb. packages. Each package comprises a flat-paperboard backing and heat-sealable cellophane overwrap.

(*Turn to page 241*)

We first asked for the highlights . . .

Said Pres. Adlerbert: **"Sunrise set a solid profit the first year, now has almost doubled it. Workers stay longer. Absenteeism is down, morale up. Union relations are good.**

Is Profit Sharing *for You?*

This Case of a Small Dairy Will Help You Weigh Question

IVAN C. MILLER
Associate Editor, "Food Engineering"

For years, Sunrise Dairies of Hillside, N. J., went about its business—looking, but not actually being, prosperous.

Then, in 1949, there came a radical move—

Employees—to some 40-odd—were told that the company had decided to share profits with them as soon as there were any to share. And here is the record of climbing profits after the changeover:

1949 — $27,000
1950 — $35,606
1951 — $40,696
1952 — $43,737
1953 — $47,553

We queried President Bo Adlerbert as to what had prompted the sharing of company profits with all employees.

"Not primarily for humanitarian reasons, as you might expect me to claim," he replied, "but rather so that everyone in the organization would understand how a business is operated and what makes profits."

It is Mr. Adlerbert's belief that if everyone in our country had a sound understanding of the simple economics of business, the quality of the country's citizenship would be greatly improved. He conceives the results as simplified and reduced government, lower taxes, and a reversal in the trend toward state socialism.

Another of his strong convictions is that voluntary profit sharing (not union-negotiated) promotes industrial harmony, accelerates creation of wealth, and speeds strides in the standard of living. Nevertheless, he adds, it is no cure-all.

Is there, then, more industrial harmony at Sunrise Dairies today than before profit sharing?, we asked.

Mr. Adlerbert assured us there is—accenting his statement with the belief that a state-disapproved, but nevertheless costly, wildcat strike in 1940, prior to profit sharing, would not have occurred had he introduced his profit sharing plan when his business started in 1935.

Here is President Adlerbert's outline of the plan: "Of our net sales, 0.5% is set aside each year from the net profit before Federal income taxes as a contingency fund. No profit sharing is provided on this amount. Also there will be no sharing should the profit be less than 0.5% of sales.

"Of the remaining profit, 6% is divided into department-manager bonuses. Then 25% of the remainder constitutes the profit sharing fund."

During the first years, 6% interest bearing certificates were issued. These were convertible to cash after one year. Now, there are both cash and certificates.

Each employee's share of the profits

". . . Profit shares are distributed part in cash, part in interest-bearing certificates. It's a red-letter day.

is determined in part by seniority. Remainder of the share of each is allotted according to each one's merit rating. The latter is determined monthly for each employee by the immediate superior. Should an employee consider his rating unfair, he may appeal to the Advisory Board for review and final rating determination.

Advisory Board Unique

Here is the story behind the Board:

To make employees feel more secure, Mr. Adlerbert gave up the right to terminate employment of anyone in the company, as did likewise all supervisors. Function of employee dismissal was transferred to an elected body—the Advisory Board—consisting of an equal number of representatives from management and plant and drivers. A union representative is an invited, non-voting, guest at meetings.

Only this Advisory Board has the right to discharge any company employee. And one of the important roles of the Board is to try to prevent development of personnel difficulties, and to solve those it cannot prevent.

During the past year, there have been so few of these problems or grievances that most of the time at the meetings has been spent finding ways of developing greater efficiency and means to make more money for the company and also for themselves.

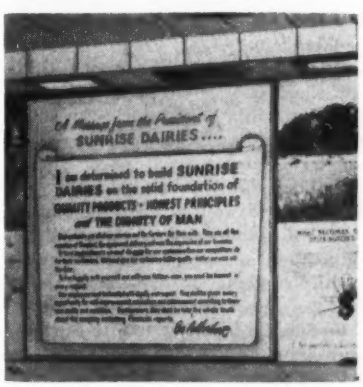
". . . Workers have the highest enthusiasm for company efficiency under the plan. Their own placarded slogans tell the story.

What has been the union attitude? we asked.

"It was my fault," explained President Adlerbert, "that union executives at first were skeptical, fearing that the objective was to undermine the union."

His opinion was that had the union been advised of the plan as employees were, before its adoption, and had its purposes and values been explained to the union in advance, then this misconception likely wouldn't have arisen.

We also interviewed L. McGinley, president of the Milk Drivers & Dairy Employees Union, Local 680, A.F. of L. And he told how he had given a


A Message from the President of
SUNRISE DAIRIES....
I am determined to build SUNRISE DAIRIES on the solid foundation of QUALITY PRODUCTS - HONEST PRINCIPLES and THE DIGNITY OF MAN

". . . The dignity of man ranks high in our concept of the outstanding values of the profit-sharing principle."

general green light to Sunrise's profit-sharing plan.

"Union management," he said, "can only be glad when all members of one of the locals receive from the employer several hundred dollars a year more than the going union wage of the industry."

Monthly Reports

A *Statement to Stockholders and Employees* is distributed to everyone each month. This advises of the profits or losses for the month and the standing of the company profit-wise for the year. Also explained are the reasons why—when either losses or profits run out of the ordinary.

Here is a quote: "You will be happy to know that we broke a new sales record in Jan. 1954, and that we are again operating in the black. Profit for the month amounted to $6,187.50."

Here, also, are several enlightening quotes from monthly letters and annual reports of the president to the employees:

"All of the increase in sales this year came from the sub-dealer routes. As a matter of fact, our own routes had a small loss of 117 daily points, a 55-point loss on the retail routes and a 62-point loss on the wholesale routes. I admit that we of management have neglected our own routes and spent most of our efforts with the sub-dealers. This clearly proves that even in a profit-sharing company, management must guide and stimulate interest in growth and efficiency or suffer the consequences of neglect.

". . . the plant during the past year has been greatly improved. A new water well was dug at great expense, electric transformers had to be installed to care for the heavier electric load required. We also purchased a new short-time pasteurizer, a vacuumizer, a case washer, and many conveyors. More than $50,000 was invested. We shall, this year, realize the benefits.

". . . On Oct. 24 wages in the plant and on the routes were increased 27¢ per hour. Frankly, I have never heard of such a big increase in any industry before.

"Price of milk also has increased substantially above last year. Yet OPS has not permitted an increase in price to our customers. The whole dairy industry in Northern New Jersey is in turmoil. Every plant claims to be losing large amounts of money. We are, too. But we can possibly carry through and still make a profit by budget reduction."

Some Advantages

After an employee has been with the organization for several years, "turnover" is rare. However, not all new employees "fit the picture" or like to work in a profit-sharing company. Even so, turnover among new employees is about the same as for any other dairy in the area.

Tardiness and absenteeism, on the other hand, are materially reduced by profit sharing. Those who have participated in previous-year extra payments from profit-sharing never are absent if they can avoid it, never late.

If a newcomer frequently is tardy or unjustifiably absent, the one who has to take over the extra work first admonishes the offender, then warns him—and if the transgressions don't stop, a complaint to the Advisory Board asking for a hearing is in order. A meeting for a hearing, or for any other purpose, can be called by any member of the Board.

A worker who does not "pull his share of the load" lowers profits for all. Co-workers will give him all possible aid to help him become more efficient —or failing that will ask for his dismissal.

Source of Profit

For a dozen years, the company made no profit. Then, after profit sharing, earnings started and increased each year. When asked where these profits came from, the president found it difficult to pinpoint.

(*Turn to page 242*)

Closeup of Profit-Sharing Factors

3 Versions Described . . . 10 "Must" Points

More than 15,000 U. S. companies share profits with their employees. A relative few are food firms—some large concerns with long-established programs, some smaller ones with plans of more recent date.

Sharing systems differ. Here are three versions:

A.—A set portion of the annual profit is accumulated, with interest, for employee retirement pay or pensions. More profit means bigger shares.

B.—Employees are paid a percentage of profits in cash, each month, quarter, or year.

C.—Employee profit shares are divided into several funds—a trust for retirement or pensions, a fund for immediate cash payment, etc.

Ways of determining shares vary. Yardsticks may be money earned (which may include incentives), seniority, on-job time, merit ratings, and so forth. What proves workable at one plant may be unsuitable at another. What appears feasible at the start eventually may require revision.

Those planning a program can save headaches by prior consultations and study of working systems. Advice can be vital, as on such factors as legal complications involving tax deductions.

Pertinent has been the formation of the Council of Profit Sharing Industries, a group of companies running active plans. Membership requirements specify that employees must be paid rates at least equal to those of the area or the business, and all regular workers must be eligible for the plan.

CPSI experience shows there must be—

1. Compelling desire for the plan on the part of management, with aim to enhance team spirit. Here, cooperation with the plant union (if there is one) is essential. It can be fatal to use such a plan to weaken a union or prevent its organizational activity.

2. Generosity sufficient to give a real feeling of partnership, forestalling any idea that an exorbitant share of extra-profit will go to management and stockholders.

3. Assurance of workers that it isn't benevolence—rather that it is their fair sharing.

4. Emphasis on partnership, rather than on amount of money, in interest of maintaining worker support in lean years. Loss periods actually can stimulate team spirit.

5. Equitable representation of employees on committees, bearing out it is their plan as well as management's.

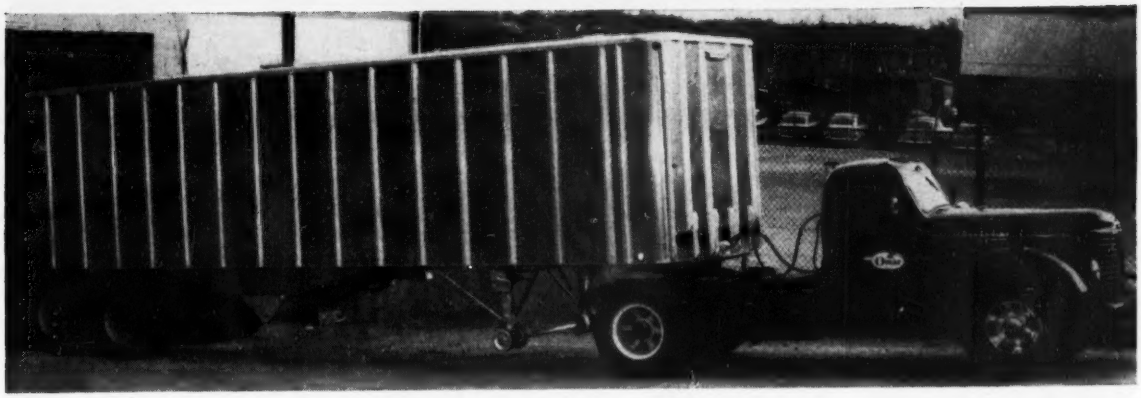
6. Full understanding that management does not relinquish either right or obligation to manage. Employees will recognize management capability—a healthy challenge to leadership.

7. No use of the plan as an excuse to pay wages lower than those prevailing.

8. Sharing of the system to fit the plant's particular situation, yet to maintain simplicity in every respect for ready understanding.

9. Constant thought to keep the plan dynamic, accenting ways to improve it.

10. Recognition by management that the plan is no panacea. Success depends upon sincere desire to be fair, with evidence of faith in the importance, dignity, and responsive spirit of the human individual.



A—Back it into dock

Bulk-Trailer Plus-Value—
Minimized Storage

OVER-THE-ROAD transport of bulk flour has brought more than lower-costs and sanitation advantages to Omar Inc. at their Omaha, Neb., bakery.

In addition it has eliminated the necessity of large storage silos. A 33-ft. flour trailer equipped with Airslide movers does the trick.

This is the second Omar bakery to adopt bulk flour handling. At Indianapolis, flour already is delivered via railroad cars.

At the Nebraska plant, flour is transported only 5½ miles by truck from the mill to the bakery. This convenient supply system reduces storage needs to a single 20-ton trailer load of flour, along with a reserve bin to allow for any variations in demand.

Trailer Details

Designed by Trailmobile of Cincinnati according to Omar's specifications for the bulk handling program, the Airslide trailer, is a modification of a tandem axle unit. Aluminum sheet is used on the roof, which also is equipped with a catwalk. Three 20-in.-dia. aluminum domes on top are fitted with pressure seals. Roof is insulated with 3 in. of Fiberglas and ¼ in. of waterproof plywood.

The floor is tapered 15 deg. front and rear to center. Flour is admitted through ports at the top and removed via three 16-in. aluminum bottom slides. These latter feed into butterfly and sock connections interchangeable with the Fuller rotary valve assembly employed with the pneumatic conveyor operations.

Capacity of the trailer is 20 tons. As now employed at Omaha, it generally carries the full load of 40,000 lb. of flour each trip. This quantity is sufficient to meet the requirements of the bakery.

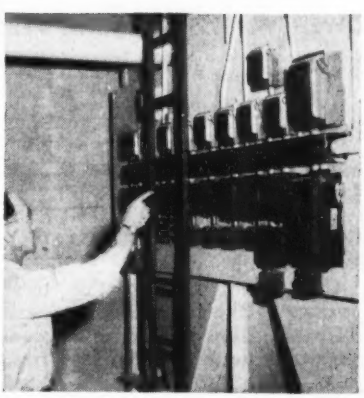
Flour Fluidized

The Airslide apparatus employs compressed air to fluidize the flour and prevent it from sticking to hopper sides. Low pressure air enters through ducts in the floor beneath the load. The flour particles become surrounded with air and the characteristics of the material changes from that of a solid to a liquid. In this state, the flour readily flows down the bin slopes. Hence the name "Airslide".

Operation of the air-supply connections and piping are electrically controlled. The trailer has a curbside connection for outside air feed. In this installation, there is a stationary compressor in the unloading dock at the bakery.

Flour is moved at the plant via gravity Airslide action and mechanical conveyor. The latter carries it approximately 225 ft. from the receiving to the blending area. Here, it is held in a two-hopper storage bin of welded construction until required for production. The bin, 30 ft. long, 11 ft. wide, and 9 ft. high, has a capacity of approximately 60,000 lb. Flour is moved through two screw feeders at the base of the bin to the blenders.

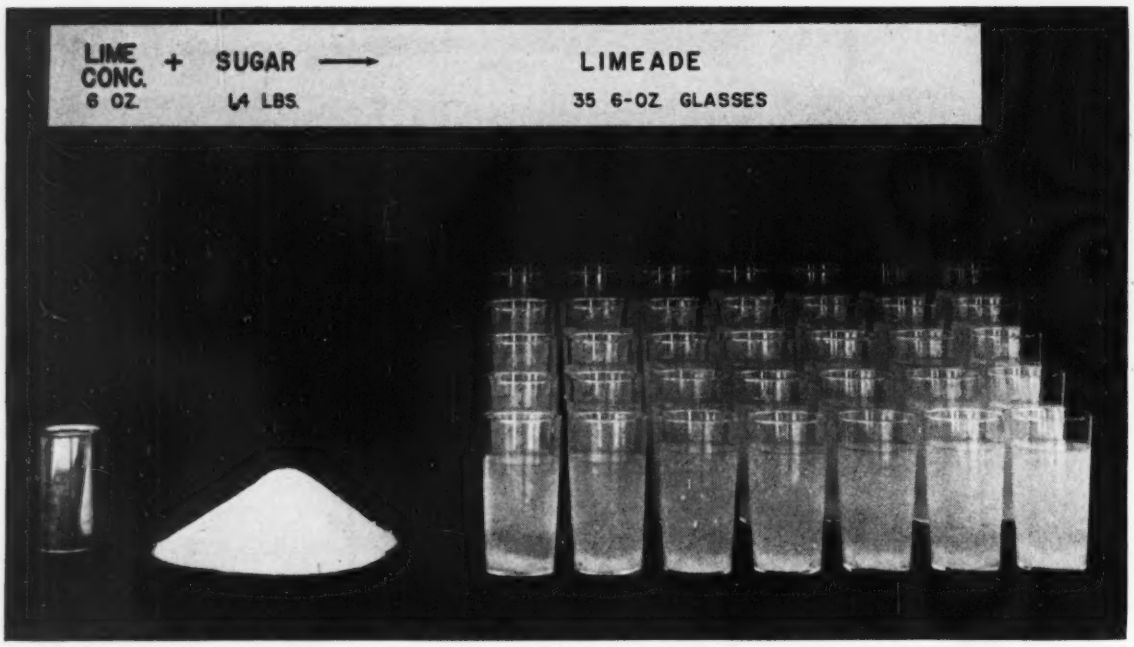
B—Make connection



C—Flour flows in automatically

At the mill, loading time for the trailer requires a minimum of 2 to 3 hr. To unload at the bakery takes about 4 hr. The storage bin has automatic "cut-on" and "cut-off" devices, permitting unattended unloading of the trailer.

Use of all-aluminum castings and parts throughout the trailer minimizes deadweight and ups net payload.



MERE 6 OZ. CAN of frozen superconcentrate (water and sugar added) makes 35 glasses (6 oz.) of limeade.

Lime Juice *Superconcentrates*

New USDA method for frozen lime juice products paves way for special citrus enterprise—may influence all citrus processing

OWEN W. BISSETT, M. K. VELDHUIS and W. C. SCOTT

U. S. Citrus Products Station, Southern Utilization Research Branch, Agricultural Research Service, USDA, Winter Haven, Fla.

Successful procedures for processing lime juice superconcentrates from which institutional limeade of true flavor can be prepared have been developed and pilot-plant-tested at the Citrus Products Station, USDA, Winter Haven, Fla.

Outstanding advantage of these products is the saving in space, and this without loss in flavor in comparison with limeade prepared from fresh juice.

Preparation entirely is from fresh fruit, with exception of the sugar needed. Excellent control is offered in that the oil content, soluble solids-acid ratio, and concentration can be held as desired, making uniform products possible.

Equipment required is on hand in orange concentrate plants. Fresh limes fortunately are available in Florida in largest quantities in the late summer and fall when orange processing equipment is normally idle. Production of limeade concentrates would extend the processing season, increasing utilization of equipment and providing employment at a slack time.

Savings in space should be of particular interest for use by the armed forces and for hospitals and institutions with limited frozen-storage facilities. It would be possible for processors to prepare and store the puree prepared for flavoring and concentrate separately and, upon order, compound superconcentrates tailored to customers' specifications.

Limeade concentrates excellent in flavor have been developed from Florida fruit. These are an 8-fold sweetened superconcentrate requiring only water for reconstitution and a 35-fold unsweetened superconcentrate needing addition of both sugar and water for preparation of the beverage.

Frozen sweetened lime juice[1] has appeared on the market in recent years and has received good consumer acceptance. This product serves well for most consumer uses, but for institutional use and especially for the armed services, more concentrated products have definite advantages. This investigation was undertaken to develop such products.

In order to be good, limeade must have the proper soluble solids-acid ratio (neither too sweet nor too tart). It must be of the right strength (neither too strong nor too dilute). And it should have the proper fresh lime flavor (furnished here by lime puree).

Solids to Acid Ratios

As a preliminary step, a series of limeades made from fresh fruit were prepared and presented to the laboratory staff for preference rating. Ratios of solids to acid were adjusted to 10:1, 12:1, 14:1, 16:1, and 17:1 by the addition of sugar. Preference was shown for the 14:1 and 16:1 samples, with 17:1 rating almost as high. Limeade having a 12:1 ratio was considered too tart.

Samples of limeades of approved ratio were diluted to 9, 10, 11, and 12 deg. Brix and evaluated. The 11 deg. Brix dilution was considered optimum, while lower concentrations would be acceptable for quenching thirst.

After establishment of a preference for limeades having a solids content of

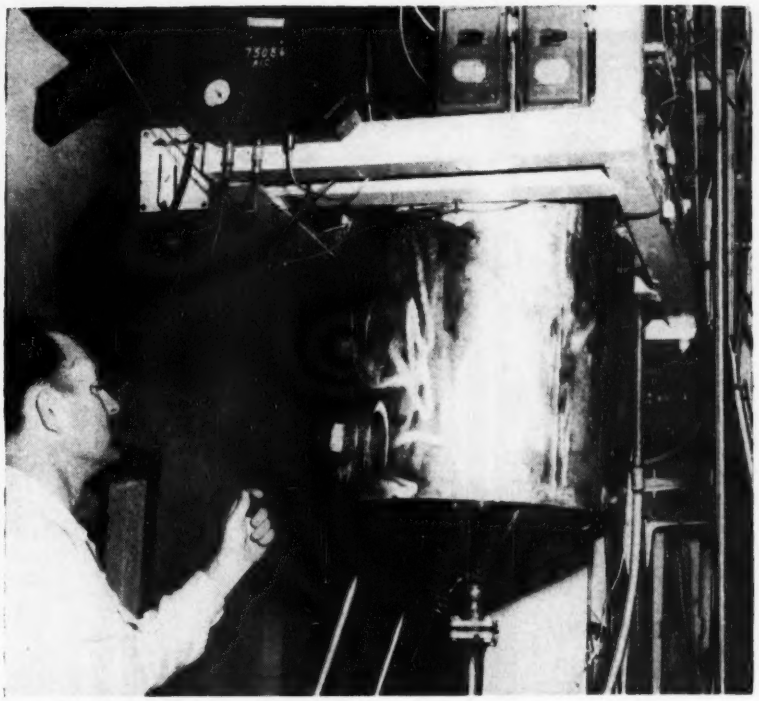
about 11% and a ratio in the range of 14:1 to 16:1, additional tests were undertaken to set the optimum flavor level as measured by oil content. Concentrated lime juice, almost free of volatile oil, was used to make limeade for these tests, so that final oil levels were adjusted by adding various amounts of flavoring materials.

Although evaporation of citrus juices removes most of the volatile oils, the concentrate does retain flavor not measurable by distillation, along with such flavor supplements that are added from other sources.

Limeades prepared from concentrates cut back with fresh lime juice were lacking in distinctive flavor. Efforts to enhance the flavor by adding cold-pressed or distilled lime oil resulted in marked improvement. But the product still was not equal to that prepared from fresh juice.

Next step in enhancement of flavor involved use of lime puree.[3] Samples of concentrated lime juice to which lime puree had been added to give a peel oil content, in the prepared limeade, of 0.003% to 0.004% produced beverages judged to be equal to those prepared from fresh juice.

Utilization of puree for flavor enhancement is, therefore, an important phase in the successful development of the superconcentrates.



PILOT-PLANT trials indicate that equipment used in Florida for orange juice concentrating is suitable for making the new "supers."

Methods and Materials

It is recognized that optimum oil levels established by the laboratory taste panel may differ somewhat from those considered best by some others, since taste preferences vary.[3] Recent commercial practice has indicated a trend toward higher flavor levels, there being marketed a considerable quantity of sweetened lime juice containing as much as 0.010% recoverable oil.

In the preparation of concentrated lime juice, fresh Persian limes were washed and the juice extracted with a rotary juice press.† Rag and seeds were removed by a screw-type finisher equipped with a screen having 0.040-in. perforations. The juice was cooled as extracted in a coldwall tank and held at 35 deg. F. until fed to the vacuum evaporator. Concentration was carried out at 70 F. in a falling-film evaporator.

When the desired concentration, generally gaged by acid content, was attained, the concentrate was withdrawn, blended as desired, filled into enameled cans, and frozen.

Lime puree was prepared in the laboratory by cutting fresh limes in halves and passing them through a screw-type finisher equipped with a screen having 0.027-in. perforations. Pressure was kept comparatively light to avoid extraction of bitter constituents from the peel. A yield of puree amounting to about 50% of the fresh fruit, and having a peel oil content of about 0.4%, was obtained.

Storage tests indicate that lime

(Turn to page 190)

† Mention of trade products does not imply they are preferred by USDA over similar products not named.

Table I—Typical Sweetened Limeade Superconcentrate

Composition of Materials	Soluble Solids		Citric Acid		Oil
	Deg. Brix	Lb./ Gal.	% by Wt.	Lb./ Gal.	% by Vol
Limeade beverage	11.00	0.956	0.73	0.064	0.003
8-fold sw. concen.	68.55	7.650	4.57	0.510	0.024
Lime puree	9.25	0.798	6.40	0.552	0.400
2.06-fold CLJ*	18.36	1.645	12.69	1.136	.....

Proportion of Materials	Volume (Gal.)	Soluble Solids (Lb.)	Citric Acid (Lb.)	Oil % by Vol.
Puree	0.06	0.048	0.033	0.400
2.06-fold CLJ*	0.42	0.689	0.477	.....
Sugar	(0.52)	6.913	.....	.....
8:1 superconcentrate	1.00	7.650	0.510	0.024

To prepare beverage: Add 7 volumes water to 1 volume of sweetened superconcentrate.

*CLJ is Concentrated lime juice.

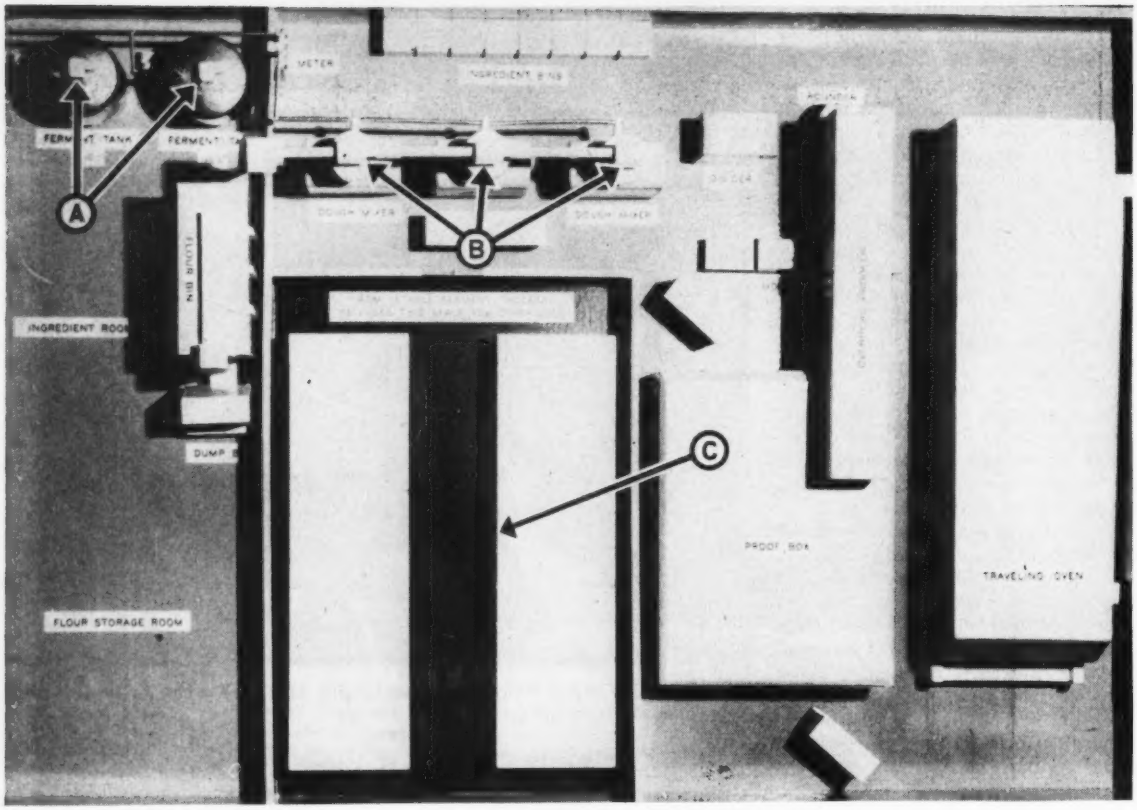
Table II—Typical Unsweetened Limeade Superconcentrate

Composition of Materials	Soluble Solids		Citric Acid		Oil
	Deg. Brix	Lb./ Gal.	% by Wt.	Lb./ Gal.	% by Vol.
Limeade beverage	11.00	0.956	0.73	0.064	0.003
35-fold unsw. concen.	.....	.....	.....	2.230	0.105
Lime puree	9.25	0.798	6.40	0.552	0.400
5.12-fold CLJ*	41.31	4.088	28.66	2.829	.....

Proportion of Materials	Volume (Gal.)	Soluble Solids (Lb.)	Citric Acid (Lb.)	Oil % by Vol.
Puree	0.263	0.21	0.145	0.400
5.12-fold CLJ*	0.737	3.01	2.085	.....
35:1 superconcentrate	1.000	3.22	2.230	0.105

To prepare beverage: Add 30.23 lb. sugar to 1 gal. of superconcentrate and dilute to 35 gal.

*CLJ is Concentrated lime juice.



How System Is Installed

Thermostatically-controlled, stainless steel tanks (A) for making of stable ferment precede dough mixers (B). Portion of ferment is directly metered into mixer. Space ordinarily alloted to fermentation room (C) is released.

BREAD MAKING SIMPLIFIED

Now in commercial use, flexible ADMI stable-ferment process abolishes sponge work, slashes time, releases space fermentation . . . Simple changeover does it

HERE'S another significant development for bakers—The ADMI stable-ferment process just revealed by the American Dry Milk Institute in Chicago.

This process specifically was designed to replace the century-old sponge operation in bread making with a method that involves using a simple, homogeneous mixture of natural fermentation products and nonfat milk solids.

Chief advantages of the new process are saving in process time and space, plus greater flexibility of operations.

First bakery to adopt the process commercially was Central Grocer's Baking Co., Montevideo, Minn., on Jan. 1, 1954. Second was Holsum Baking Co., Gastonia, N. C. Researchers at Bowman Dairy Co., Chicago, and National Dairy, Oakdale, N. Y., have found the new method practical and economical.

Sponge-Dough Way

What has the baker been up against with the old sponge-dough process? Regardless of the capacity of the mixer, approximately 60% of the flour used in each batch must go into the sponge, and the remainder in the dough.

To make a sponge, for example, there are mixed to a rather stiff mass: Flour, 350 lb.; water, 200 lb.; yeast, 11 lb.; yeast food, 3 lb.; and malt, 2 lb. Sponge set at 76 deg. F. rises to 86 F. in an 80-deg.-F. fermenting room.

After 4-6 hr. in the fermenter, sponge is dumped into dough mixer. To make the dough, the following are added: Flour, 200 lb.; water, 160 lb.; sugar, 30 lb.; salt, 11 lb.; shortening, 22 lb.; and non-fat milk solids, 33 lb. Dough is then fermented 20-60 min. before continuing to the make-up machines.

How New Process Works

Now let's see how much simpler process is, using operations at The Holsum Baking Co. plant in Gastonia, N. C., as an example.

Here additional equipment installed to match a 2,400-loaf hourly output included: (1) Two double-wall, stainless steel, 1,000-gal., hinged-top tanks equipped with automatic controls for heating and cooling; (2) sanitary

pumps to disperse dry materials with water in each tank when making up the ferment and to pump ferment from tank through meter and into mixer, and (3) a standard water meter.

Floor space taken up by the two ferment tanks is about 40 sq. ft., or the same required by two 10-ft. dough troughs.

Now for preparing the ferment. First, water (8,400 lb.) is metered into a tank. The remaining dry ingredients —nonfat milk solids, 720 lb.; sugar, 360 lb.; yeast, 240 lb.; salt, 240 lb.; yeast food, 60 lb.; and malt, 50 lb.— are introduced into a stainless steel hopper funnel tapered to approximately 45 deg. (see drawing). Funnel is attached to a Tee, which is hooked up to the pipe between pump and tank.

Pump is turned on, and the valve is slowly opened. Water is drawn from the bottom of the tank, pumped through stainless sanitary pipes, and returned to the tank through the top. "Drys" are fed from hopper into the stream of water, then whipped in a circulating flow of water through pump and into the tank. Recirculation in this manner assures uniform distribution of solids in water.

Ferment is kept under agitation at 100 deg. F. for 6 hr. With the ferment now ready for use, it is cooled to 60-70 deg. F. by running cold water through the tank jacket.

At the Holsum Bakery, the ferment is prepared between 9 P.M. and 1 A.M., and held throughout the next day's operations. Ferment remains stable for at least 36 hr. If cooled to lower temperatures (in the 40's), ferment remains stable for longer periods. For this reason, any ferment remaining at the end of the day's run may be drawn from the tank and refrigerated for use on the following day.

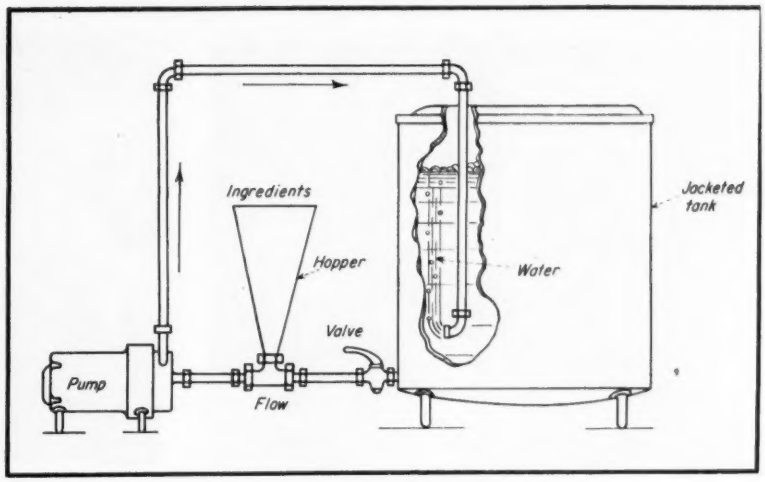
The ferment (400 lb.) is metered into a standard type dough mixer, in which has been scaled 500 lb. of flour, 30 lb. of sugar, 15 lb. of shortening, and 5 lb. of yeast.

After mixing, behavior of the doughs is comparable to that of those made with a sponge. And the doughs are handled by standard bakery equipment in the conventional manner.

7 Advantages

In taking stock of the production advantage, Institute Director B. W. Fairbanks and two on his staff—R. J. Remaley, in charge of scientific development, and L. H. McLaren, bakery service representative—sum them up in this manner:

1. The old setting of individual sponges, plagued by troublesome batch variations, is eliminated.



How Ferment Is Made

Water is metered into jacketed tank. Pump is started and valve is opened to circulate water that picks up dry ingredients (yeast, yeast food, malt, salt, sugar, and nonfat milk solids) to form homogeneous mixture. Ferment is kept at 100 F. for 6 hr., then cooled to 60-70 F. before it is ready for metering into dough mixers.

2. Valuable floor space allotted for fermentation rooms—as much as 25-30% of the production area between flour blender and oven—can be released for other purposes, such as the addition of a sweet goods line.

3. Processing time—from mixing to dough dividing—can be slashed 4½-5 hr.

4. Various breads, from balloon to compact types, as well as other yeast-raised goods, can be made. Process is so flexible that breads greatly may be modified by making formula adjustments at the dough stage.

5. Work load is simplified, since enough ferment for a full day's production of yeast-raised products can be prepared at one time. Too, the baker need no longer dump sponge from mixer, wheel sponge trough to fermenter, take sponge out of mixer, dump sponge into dough mixer, and grease dough troughs.

6. Product uniformity is assured from batch-to-batch and day-to-day through closer, automatic controls. Since human errors involved in batch mixing are out, uniform quality doughs are now handled better on make-up machines—and with less production-line stoppage.

7. Process flexibility permits baking specifically to orders, thereby minimizing losses due to over- or under-production.

Key to flexibility of process is the ferment stability. It makes little difference if too much ferment is produced, for excess can be stored under refrigeration to be used the following day. But sponge won't keep.

Institute Director B. W. Fairbanks explains, that full adoption of the process would mean a 60% increase in the use of nonfat milk solids in breadmaking. These solids are an economical and concentrated source of calcium and proteins (which comprise 37% of the volume). They also are rich in water-soluble, B-complex vitamins, and other nutrients.

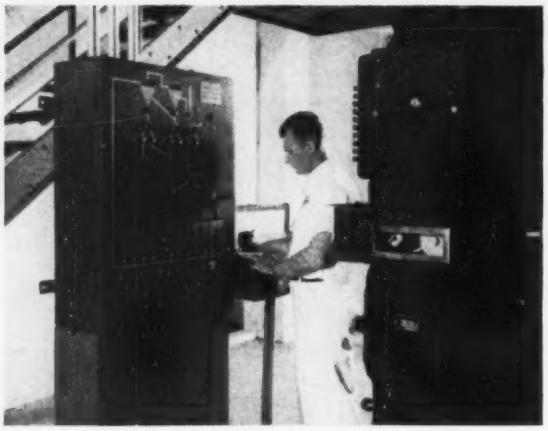
Also, breads containing 6% milk solids (based on the weight of flour) are reported by USDA to have better interior and exterior characteristics than those made with less solids. Air holes are fewer and more uniform. Texture is softer and more silky. External appearance is more attractive. Loaves are bigger and more symmetrical. They also have appealing golden-brown crusts as well as better toasting and eating qualities.

One Right After Another

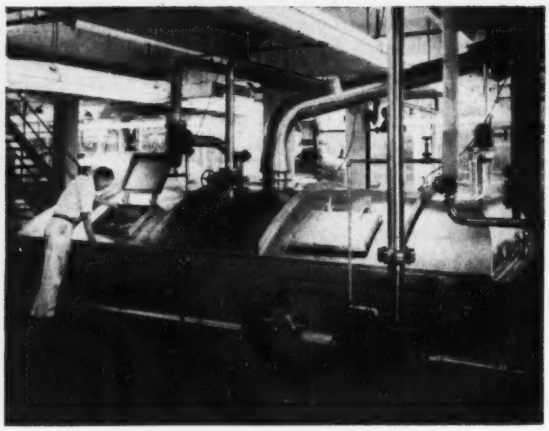
New developments in baking have been coming along fast, the ADMI process described here being the most recent.

Also spectacular is Wallace & Tiernan's new continuous dough-making system (FE Apr. '54, p. 88). And now in pilot-stage operation is American Machine & Foundry's streamlined dough process. Both offer the baker lower cost per pound, plus other operational advantages.

Meantime, new instrument applications fast are evolving to safeguard product quality by automatically controlling dough mixing, fermenting, and proofing, as well as bread baking and cooling.



Pneumatic for grains



Company-type hop jack

Original Design and Techniques *Make the Difference*

In Implementing the High-Output Plant

West Coast brewery scores with double-jacketed cookers, special hop jacks, Freon-12 wort cooler, rectangular fermenting tanks, miles of varied conveyors including keg monorail, and separate pneumatic bulk-grain movers . . . Engineering know-how beats site handicaps

W. D. RIGG and RODNEY HANSEN

Respectively, Resident Engineer and Assistant Superintendent, Olympia (Wash.) Brewing Co.

Outstanding innovations in equipment design and arrangement, plus an unusually efficient materials handling set-up, make the new streamlined facility of Olympia (Wash.) Brewing Co. decidedly different.

The thinking behind this pacemaking expansion—which is seen boosting annual production of the company to 750,000 bbl.—stresses two prime factors: Most effective brewing techniques and soundest engineering.

Here, quality is maintained by use of the best ingredients, handled by trained, conscientious craftsmen. Modern machinery and up-to-date operating methods, supported by unfailing flow of basic steam, water, power, and light, have stepped up output of one of the West's older, most reputed brands, the light-malt beverage, Olympia.

The company's forthright move has been in line with increasing demands for Western brands of beer, marked by the continuing upsurge of population in the area.

Solving Ground Problems

Because of the unusual topography and limited area where the plant is situated, materials handling has posed knotty problems. The site is a peninsula-shaped bluff, some 30 ft. above the railroad loading-unloading point. A major percent of incoming and outgoing shipments are by rail. Practically no storage space is available for finished, packaged beer. So a continuous in-out handling system is used.

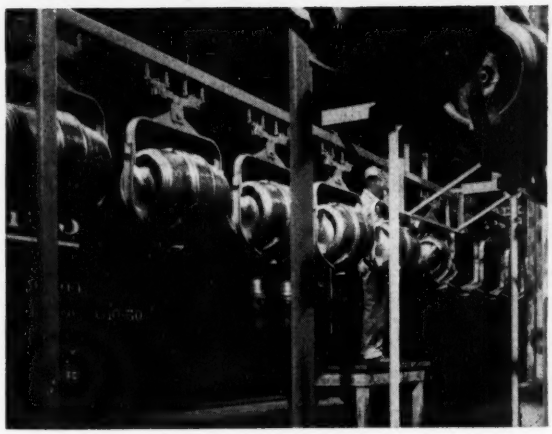
For most efficient handling, incoming empty bottles and cans and outgoing finished bottled and canned product move on a series of belt conveyors, and both empty and filled kegs travel on an ingenious monorail. These inclosed conveying systems run through sloping tunnels, under buildings and roads, to the railroad below—thus saving space and not obstructing traffic movement. There are, of course, ample truck loading facilities at the plant level.

Brewing Olympia Beer

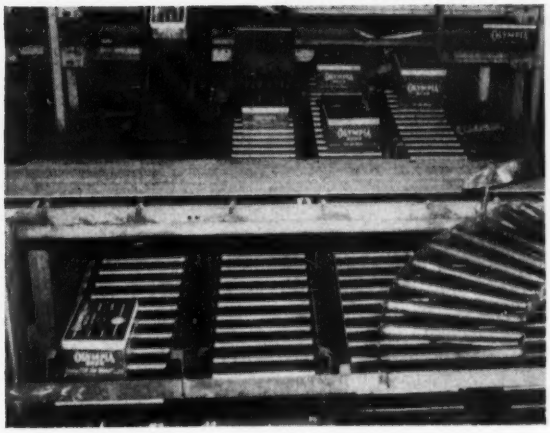
Let's look at the current results produced by this team of technologists by starting at the beginning of the brewing process:

Initially, there is the weighing and grinding of barley malt. Three kinds of malt are blended into each brew, and one of these—the six-row Midwestern malt—is obtained from three sources to maintain uniformity of product. Also, the two row Western and the six-row Pacific Coast malts are separately weighed and milled in five operations. However, this all is automatically handled on a flow-line system control board located adjacent to the scales.

To set up this operation, the operator adjusts the electric eye cut-off hand on the weighing scale to the exact amount in pounds of grain required. He also uses a code on the printing device of the scale to indicate



Monorail for kegs



Rollers, belts for cases

kind of material being handled and brew for which it is intended.

Next, the air conveying system is started and the operator opens the electrically operated valve at the bottom of the malt or adjunct bin from which he is drawing. Electric interlocks now insure the proper sequence. The grain is conveyed to the weighing hopper and, when the selected weight is reached, the electric eye cut-off hand of the scale will stop the conveyor. The scale printing device automatically records on a tape, by code, the kind of material, brew number, and the exact amount weighed.

After milling the malt is chuted to the ground-malt storage hopper and thence, when ready, to the mashing operation. Refined corn grits and rice are chuted from the scale hopper to the cereal cooker.

Single-floor brewing is one of the outstanding features of this brewhouse. Having all equipment within sight permits a closer control by the brewer—saves many steps a day, and thus substantial labor. Pumping of mash or wort is controlled from this operating floor.

All equipment in the brewhouse addition is of stainless steel or stainless clad, improving sanitary conditions and reducing cleaning time to a minimum.

Temperature and time elements controlling the cookers are manually operated. However, an extremely wide temperature chart, traveling at a fast rate, rapidly records accurate information of conditions.

Mashing

During the mashing cycle, the starch of malt, rice, and refined grits is converted to the disaccharide-maltose (about 75-80%) and to residual dextrins (20-25%). The dextrins contribute to the body of the beer and help to build foam—the "head" on a glass of beer.

Mashing by infusion, the method employed at this brewery, requires two cookers. One cooker contains the cereal adjunct and a small percentage of the malt. The other contains a major portion of the batch of the malted barley.

That portion of the malted barley added to the cereal cooker is "mashed in" at a temperature of 99-117 deg. F. at the rate of 100-110 lb. per bbl. of water. Allowing this to rest for 15-60 min. liberates the diastatic enzymes inactive in the dry malt. Soaking also tends to make the starch soluble.

Rice and refined grits are mashed-in after a similar rest period at the same rate (100-110 lb. per bbl. water).

FOR FLOWSHEET of Olympia lines: See p. 142-145

Steam heats and boils this mash. Constant stirring of the mash continues until it is pumped to the malt cooker.

Ground malt is mashed-in at 99-117 deg. F. in a malt cooker having two separate steam jackets. One of these jackets is used when heating the lower part, and both are used to heat lower and upper part. Thus, the lower jacket is used when heating the mash, and both are employed after the batch of mash (adjunct) is added. This eliminates product cermelization and burn on the cooker walls.

The mashed-in malt is allowed to rest for a period of time at 99-117 deg. F. Then the boiling cereal mash is pumped into the malt mash at a predetermined rate. Malt mash at 118 F., plus the added cereal mash at 212 F., produces a combined mash temperature of approximately 160 F. Rate at which temperature of the malt mash is raised from 122 F. up to 160 F. is of prime import.

The diastatic enzyme exhibits optimum activity at about 154 F. So, the slower the rise, the longer the mash will be at optimum temperature range for enzyme conversion of starch to fermentable surgars. Conversely, fast temperature rise will affect fermentable sugar content and raise the dextrin content. The resultant temperature of 160 F. favors formation of dextrins, though some maltose also is formed.

Constant 160 F. is maintained until all traces of starch have disappeared before increasing temperature of the mash to 172 F. At this higher heat the enzyme becomes inhibited and so the dextrin to sugar ratio remains stable.

When 172 F. is obtained, the mash is pumped to the lauter tub. This is a shallow, large diameter tank with a double bottom. It has a motor driven center shaft that rotates the lautering knives or rakes. These are turned slowly through the mash to maintain a uniformly loose filter bed of grain. The large diameter gives maximum grain surface, provides optimum grain depth, and permits more efficient extraction of the grains.

Lautering

After a slight rest period, the draw-off cocks are opened, permitting the wort to run through this filtering medium into the grant directly below. It is recirculated, for about 20 min., by pump, from lauter tub to grant until the wort becomes brilliant in appearance.

Clear first wort then is pumped from the grant, which serves as a small collecting tank, to the brew kettle. First wort contains about 20% solids and constitutes about one-third the total volume of the brew. After the first wort has been run-off, the grains in the lauter tub are sparged

with 173 F. water to extract residual sugars and soluble proteins.

Sparging is metered so as to provide the correct quantity of wort from this batch in the brew kettle and, also, at the correct Plato reading (percent of extract in wort).

Spent grains are dropped from the tub into trucks for delivery to dairymen, who feed it in the wet state to stock.

Brew Kettles

Wort in the brew kettle is heated as it percolates through the tubes of a steam chest in the center of the kettle near the bottom. Heating and filling are regulated so wort is brought to a boil just as the kettle is filled. As another important procedure, wort boiling accomplishes many results, chiefly: Evaporation or concentration, sterilization, extraction of hop flavors, coagulation of protein, destruction of enzyme, etc. It continues for 90 min., with addition of hops at three stages.

Hop Separation

Next is separation of hops from wort. From the brew kettle, wort and hops are pumped to the hop jack. This unit, designed by Olympia, is a rectangular, stainless steel tank with a perforated or grid bottom located above the slightly pitched flat tank bottom. The hops form a filter bed on the grid and retain most of the coagulated proteins contained in the kettle wort as it filters through this medium.

Wort is pumped through an outlet in the bottom of the jack to wort storage tanks on the floor above. These are intermediate, momentary holding tanks, between hop separation and wort cooling. The shallow, flat bottom construction of these tanks allows further removal of the protein coagulate by sedimentation.

Spent hops are a valuable soil conditioner, since they have a fairly high nitrogen content and act as a mulch.

Wort Cooling

This shell-and-tube cooler utilizes well water (50 F.) through twelve sections of the unit and Freon-12 (31 F.) through two sections. Discharged water at 120 F. is pumped to a hot water tank for use in mashing-in and for keg washing, and the remainder is heated to 173 F. in a steam heater to be used as sparge water for lautering.

The cooler reduces wort temperature from near boiling point to 45 F. at the rate of 200 bbl. an hour. Aeration also is accomplished in the cooling cycle, which later is essential for a vigorous growth of yeast cells in the fermenting tanks.

Three kettles supply wort to the storage tanks and thence to this cooler, making this cooling operation nearly continuous (except for brief shutdown periods for cleaning and sterilizing).

This is the last operation of the brewing cycle. All brewhouse units are thoroughly cleaned and rinsed after each brew.

Yeast and Fermentation

Fermentation is in three stages: Starters, primary fermenters, and secondary fermenters.

Quality beer depends so much on yeast that its importance cannot be overstated. Yeast is the vehicle of a controlled brewery fermentation. Fermentation of wort by brewers' yeast achieves reproduction of yeast necessary for future fermentation, development of flavor substances peculiar to each strain, precipitation of protein substances, lowering of pH, and complete attenuation with accompanying production of CO_2 gas and alcohol.

Starter—As cooled wort is being pumped into starting tanks, liquid brewers' yeast is forced into the infeed line at the rate of 1 lb. for each barrel of wort. In a matter of hours, the protein coagulate and less vigorous yeast cells gravitate to the floor of the starting tanks, providing a clearer, more efficient fermentation.

Primary—The primary fermenter, like the starter, is an enclosed, rectangular flat-bottom tank housed in a refrigerated building. Since the process of fermentation produces heat, these fermenters have stainless steel attemperating coils in which a refrigerant (propylene glycol) is circulated to maintain or regulate temperature of the beer.

These rectangular, 17,877 gal. tanks are used to save cellar space and provide more efficient fermentation. A comparable, conventional, cylindrical tank requiring the same floor space would hold only 15,903 gal.—or 12½% less capacity than the new rectangular tank.

The primary fermenter accounts for 85 to 90% of the entire fermentation. The other 10-15% occurs in the starter and in the secondary fermenter.

Rate of fermentation is governed by two factors: Seeding rate (or the amount of yeast used) and temperature of fermentation. High yeast rate and high temperature will accelerate fermentation. However, the combination of high pitching and high fermenting temperature adversely affects the final product. Fermenting temperatures carefully are controlled from 45 to 52 F. by use of the refrigerant circulating through the attemperating coils.

About 60-75% of the yeast settles to the floor of the tank after five to six days in the primary fermenter. After this period, CO_2 gas is discharged at a very slow rate and product temperature has receded to 47-48 F. The settled yeast remains in the tank as the beer is pumped to the secondary fermenter.

Yeast for future use is reclaimed from that which has settled on the floor of the tank. A sanitary, portable, stainless steel gear pump is employed in transferring the yeast through hose and pipe line to a yeast vibrator. This unit has a screen of 30-mesh stainless wire cloth. Operating at 60 oscillations per second, it removes entrained protein coagulate from the yeast. From the screen the liquid yeast is pumped to a stainless steel calibrating tank, and measured for seeding a subsequent starter.

Surplus yeast is pumped to the yeast processing plant, dried on a double drum rotary steam dryer, sacked, and used as a supplement in the feed mixes of poultry, fur-bearing animals, and fish raised in hatcheries.

After each pumping operation, all tanks, pumps, hoses, and pipe lines are thoroughly scrubbed with a mild antiseptic solution. A careful and complete rinsing with the brewery's pure well water insures against the slightest contamination.

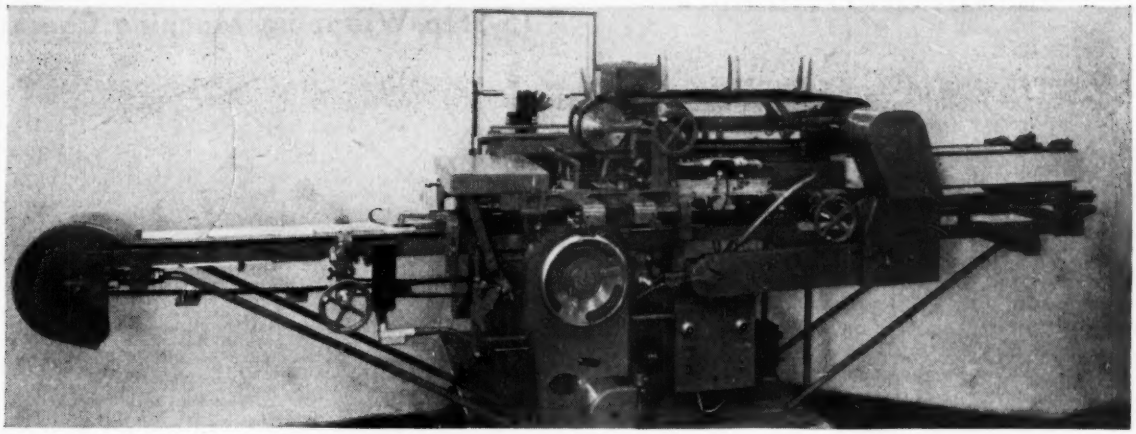
Secondary—Beer remains in secondary fermentation from six to seven days while its temperature is lowered to 32-34 F. by attemperation and cellar refrigeration. As gradual cooling continues, both the protein products and residual yeast settle on the tank floor.

During secondary fermentation, three objectives are accomplished: Completion of the last attenuation (about 5-10%), lowering the temperature, and natural clarification of the beer by sedimentation of proteins and yeast.

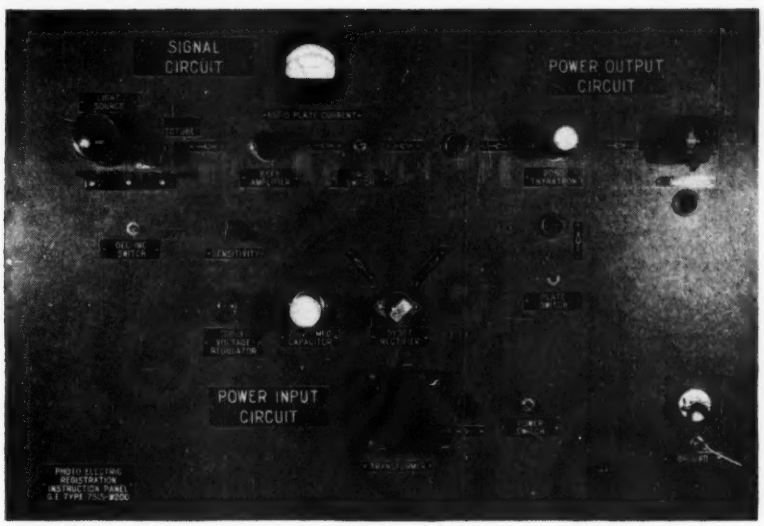
At the completion of the fermenting cycle, beer is filtered through diatomaceous earth before entering the "ruh" stage (rest or aging). This filtration removes any yeast cells or protein material that might be in suspension at this point. Because the flavors developed at near freezing temperatures are more delicate and subtle—less harsh than those developed when beer is allowed to mature at elevated temperatures—beer passes through a double-pipe cooler (sodium chloride brine used here as refrigerant) on the way to the "ruh" cellar to insure temperature of 32-34 F.

During the "ruh" stage, beer is stored under an atmosphere of CO_2

(*Turn to page 221*)



Complex overwrap unit . . . and panel showing its circuits



Those old bogies—down-time and service calls—are put to rout by a graphic system of in-plant instruction, proving—

"Your Own Men Can Care for Those Machines"

EDWIN MINNEMAN
Fred Todt Co., Seattle

Plant men you've got right on the job will be able to keep your complicated machinery ticking at high efficiency and with little downtime—provided you go about training them right.

Here's the case in point: We at Todt faced a tremendous task of shaping up packaging operators in widely scattered frozen-food plants. And, notably, we accomplished it with the aid of some relatively simple instructional drawings and derivations.

We built the program around annual one-week schools. Any individual food manufacturer can employ the same technique, applying the training whenever necessary.

Proof In the Teaching

Does it pay off? Well, before these schools were started, our service engineer drove 85,000 miles to handle service calls and call-backs for 20 wrapping machines in as many frozen-food plants.

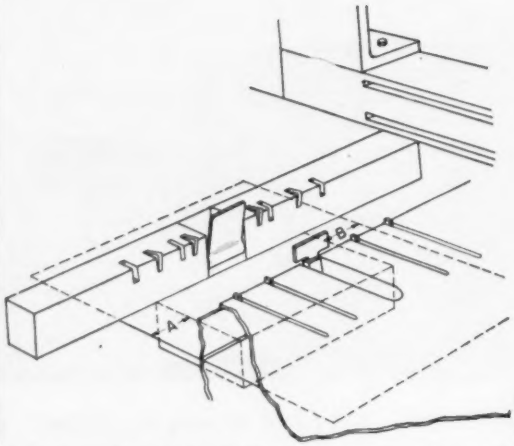
Today, as a result of the schools—and even though there are now ten times as many machines in use—the calls have been reduced to 5% of the number required seven years ago.

Training Task Complicated

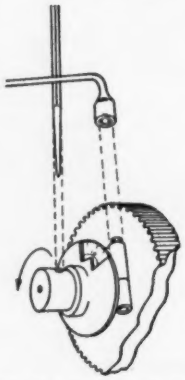
Due to the non-homogeneous personnel represented by the trainees, planning the instruction procedure for the courses proved a challenge to teaching ingenuity.

In attendance were foremen of wrapping and freezing departments, plant engineers, machine mechanics, and operators. Some had had no more than grade school training. Some were

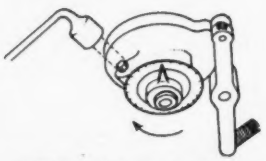
15-Step Wrapping Machine Checkup



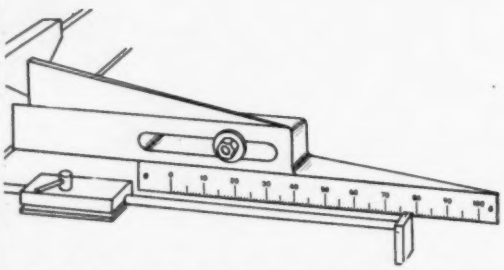
1 Turn machine by hand 'til elevator has raised top of package into this position. Wrap should arrive in position shown with dimensions A and B equalized, as detailed in Fig. 2.



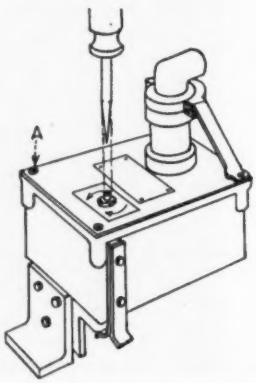
2 Turning pointer in direction of arrow will increase dimension A (Fig. 1). Loosen clamp nut, as shown. Change pointer one or two points at a time and check wrap position for each change. Retighten nut each time. Be sure (see Fig. 3) that paper release cam is properly set when procedure is followed.



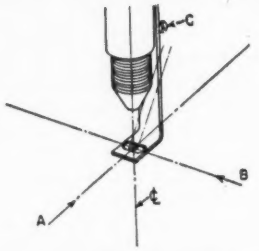
3 With package in Fig. 1 position, cam should just break over high point, as shown here. Later, adjustment of one or two points may be needed when unit runs at full speed.



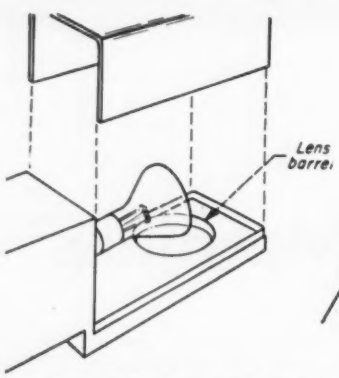
4 After Figs. 2 and 3 adjustments, set paper stops to touch edge of wrap with dimensions A and B (seen Fig. 1) remaining equal.



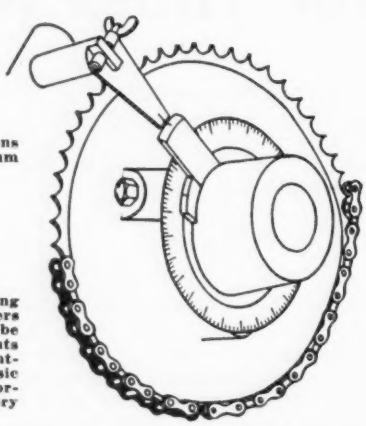
5 If spot on paper is dark on light background, switch should be on 'light decrease' position — reverse for light spot on dark background. Note that silver foil has same reaction as dark background if spot is white. Caution: Use small screwdriver and light touch when turning this switch.



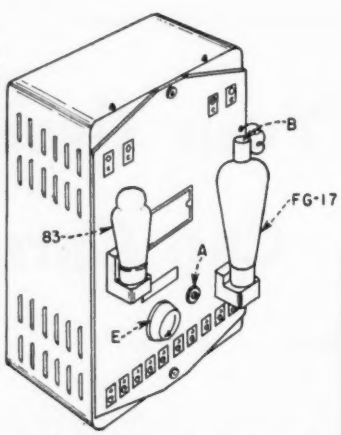
6 Check light spot from positions A and B. It must be precisely aligned with center line of scanner lens. Loosen clamp on light and make needed adjustments. To remove lens for cleaning, loosen thumbscrew C. Inside must be free of dirt. After cleaning, adjust lens position to get maximum illumination on piece of semi-opaque paper laid across slit inside scanning head (found by removal of four top screws, A, seen in Fig. 5). Slit should be about $\frac{1}{4}$-in. wide and centered with light beam.



7 Loosen small clamp screw on lens barrel and adjust lens for maximum uniform intensity of light spot.

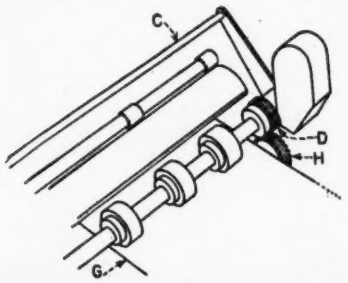


8 Turn machine by hand (holding paper feed trip open) until pointers line up as shown—pointer marks to be precisely in line. Both breaker points (seen Fig. 12) should close when pointers align. If points don't close, basic timing will need correction (by thoroughly trained mechanic or factory representative).

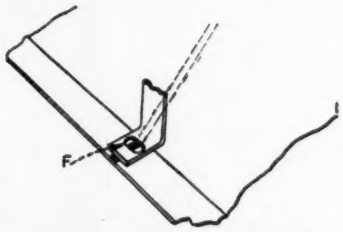


9 After aligning pointers (Fig. 8) so breaker points L and M (Fig. 12) are closed, proceed as follows: Turn on switch below panel seen here. Wait 5 min. for time-delay switch to close. Set E sensitivity dial at about 6 or 7. Remove cap B from FG-17 (Thyratron) tube and replace. (Caution: While removing, do not touch ground with other hand.) Passing dark object quickly under light source beam at point F (Fig. 11) should produce glow in Thyratron. Then eye is ready for operation. (Caution: Setting dial too high will cause Thyratron to glow on slight flapping of paper.)

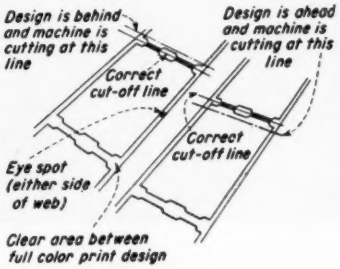
Offers Pattern for Your Own Training



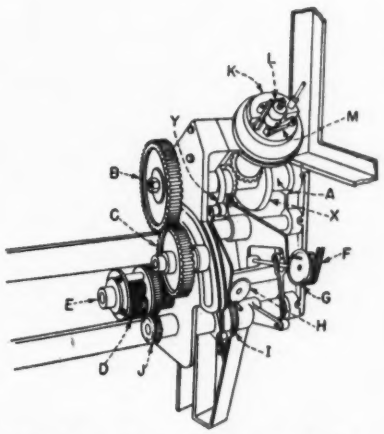
10 Lift handle C and, by trial and error, position wrap G so knife cuts precisely on proper cut-off between designs. When resetting handle C, check to see that gear D meshes with gear H.



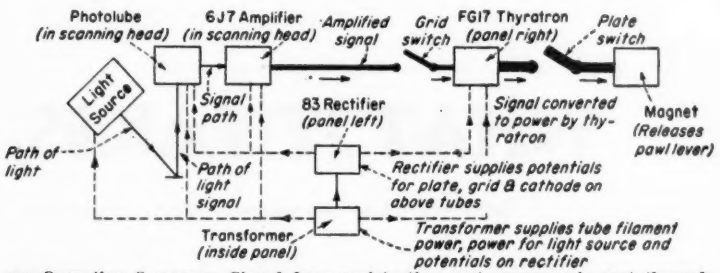
11 Now turn machine by hand wheel until dark spot is directly under light beam, as shown here. Returning to dial shown Fig. 8, (loosen clamp screw.) Without disturbing position of spot as shown here, rotate dial 'til pointers again are aligned. For fine setting, see Figs. 12, 13, 14.


Design is behind and machine is cutting at this line
Design is ahead and machine is cutting at this line
Correct cut-off line
Correct cut-off line
Eye spot (either side of web)
Clear area between full color print design

13, 14 Design factors. Left: If design consistently is behind, as shown here, loosen clamp (see Fig. 8) and rotate dial clockwise one or two points to correct. Do not change knife dial (Fig. 2) to correct this. Run 10 or 15 wraps after each dial change until eye corrects at proper sequence again (about once in every three or four wraps). Right in sketch: If design consistently is ahead, as shown, loosen clamp and rotate dial counter-clockwise one or two points to correct.



12 Paper feed operates through shaft A, through gear B, through gear C, into differential E and drives paper feed roll through chain F, per definite rate established by number of teeth in change-gear B. For fine increments of wrap dimension not supplied by change-gear drive, levers G and H work against cams X and Y, operating pawl I, which drives through gear J into differential and thus out through paper-feed roll drive-chain F. Lever G is held from working against cam X by a locking latch. Lever G operates only when wrap slips behind register and electric eye energizes magnet, which releases locking latch. Latch again locks lever G when wrap has been brought into register. Length of arm for lever H is changed by turning small wheel handle. Length of this arm is set so drive supplied by change-gear B, plus increment supplied by this lever arm, total $\frac{1}{32}$ to $\frac{1}{16}$ in. less than a full length of wrap —that is, for 8 in. cut off length of arm, H should be set so that cutoff is $7\frac{15}{16}$ in. to $7\frac{31}{32}$ in. Arm H must set with eye switch off so lever G does not operate. Additional amount to total 8 in. is supplied by lever G when eye operates. As trial point, set lever G between 25 and 35 on scale. With machine running under power and electric eye in operation, lever G should correct once out of every three or four cutoffs. If lever G corrects consistently oftener, move lever H one or two points higher on scale. If lever G corrects consistently less than that amount, move lever H lower on scale. Important: Remember that lever H controls basic cutoff, while lever G controls amount of correction made by electric eye. Breaker Points: Gap on breaker points L and M, when in open position, should be approximately .030 in.


Photolube (in scanning head)
6J7 Amplifier (in scanning head)
Amplified signal
Grid switch
FG17 Thyratron (panel right)
Plate switch
Light Source
Signal path
83 Rectifier (panel left)
Signal converted to power by thyratron
Magnet (Releases pawl lever)
Path of light
Path of light signal
Rectifier supplies potentials for plate, grid & cathode on above tubes
Transformer (inside panel)
Transformer supplies tube filament power, power for light source and potentials on rectifier

15 Operation Sequence: Signal from registration spot on paper is sent through phototube every time spot passes under scanner (Fig. 11). Signal can't get through to magnet unless both grid and plate switch are closed. These switches are geared with paper drive by an electric eye timing dial (Fig. 8). If both switches are closed, light signal goes through to magnet, magnet releasing pawl lever G (Fig. 12), which operates and adds to paper feed to bring design ahead. On next wrap, spot signal then will be ahead of closing time of grid and plate switch, and signal cannot get through to magnet. If paper feed gear B (Fig. 12) plus pawl lever H are set to cut just short of a full wrap dimension, (as instructed Fig. 12), design will again recede until signal coincides with closing of grid and plate switch, whereupon magnet will again trip to operate pawl lever G to bring design into register. Setting of dial (Fig. 8) determines points in cutoff cycle at which spot will make correction. Clockwise rotation of this dial setting will move design ahead; opposite rotation will move design back.

college graduates with engineering degrees. Some were mechanical wizards, others were mechanically inept.

The best of teachers well might hesitate attempting complex instructions to 50 such widely different individuals.

Keys To Effective Method

Two general procedures were adopted: Blackboard-taught theory plus practical rebuilding of machines.

Use of both techniques was deemed necessary, since the groups were too large to permit employment of machines alone for demonstration and illustration.

With blackboard teaching came the need for visual aids. These have had two definite values:

1. They provided the vehicle for arriving at initial comprehension and understanding.

2. They serve as refresher references.

Separate small components of machines taken from parts stock were also used to demonstrate various timing problems during the blackboard sessions.

Conveying to the students an adequate understanding of the electric eye used on the Model FF unit (Packaging Machinery Co.) was one of the most difficult teaching problems. Detailed circuits were obviously beyond the grasp of many of the students. But then a functional block diagram of the electric eye proved most useful.

Set up was a demonstrator circuit panel that actually worked (see photo). It incorporated the compact mass of wires and tubes plus all the explanatory features covering the function of the photoelectric amplifier. Thus the teaching was materially simplified.

Blackboard sessions required approximately two days. For the balance of the school time the students were divided into three groups, with some

(Turn to page 226)

Experts

WHAT IT TAKES

Give scores of significant across-the-board

VITAL TO ALL OF YOU in the multi-branch food industry—as they were to candymakers from far and wide—are the advanced practices reported at the 8th annual meeting of the Pennsylvania Manufacturing Confectioners' Assn. in Lancaster, Pa.

Highlights covered:

1. Latest in bulk handling (mechanical, pneumatic, and unit container) of sugar.

2. Newest in bulk handling and receiving of liquid chocolate.

3. Advanced applications of automatic instruments for measuring and controlling the processing variables.

4. Adoption of statistical methods to quality-control work.

5. Findings on uses of antioxidants and extension of product shelf-life.

6. Retension of gloss in hard butter coatings—and how to use them.

When and How to Handle Sugar in Bulk

To the large user, a bulk sugar handling system generally is economical and advantageous. But, pointed out E. W. Meeker, American Sugar Refining Co., New York City, the small user simply cannot justify handling sugar by bulk means because it will probably cost him too much to install the equipment and his pay-off time will be too long.

For example, let's assume a manufacturer uses about 15,000 bags of sugar annually and has an overall net savings of about 30c. per 100 lb. If cost of installation is $20,000, it would take about 4½ yr. to amortize this cost. However, if installation cost is $30,000, pay-off period would extend over 6 yr. (which is too long).

Since many consider amortization over 3 yr. to be excessive, the same customer would have to use about 35,000 bags, or more, annually to bring the period within 3 yr.—a reasonable risk.

Moreover, a bulk sugar system is best in plants where sugar is used at relatively few points, otherwise equipment and installation costs will be overly high.

Pneumatic Sugar Conveying

There are many outstanding advantages in pneumatic conveying, among them simplicity of layout, ease of installation, flexibility of application, low handling cost, cleanliness, low maintenance, and utmost in sanitation. This was the opinion of R. R. Heard, Jr., Fuller Co., Catasauqua, Pa.

In the case of a modern food plant, these benefits rightfully can be amplified manyfold, due, of course, to the cleanliness and sanitation features, which minimize possibility of contamination and infestation.

Bulk Sugar in Portable Bins

E. A. Pagels, Tote Systems, Inc., New York City, stated that the manufacturer considering basic bulk sugar handling is faced with two decisions: Volume at which tooling up for bulk handling is justified and choice between unit containers and storage bins.

It is believed, he went on, that unit containers provide greatest savings per dollar investment. Flexibility is important, since it is easy to add a few containers if volume increases, whereas when maximum capacity of storage

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bin is reached, only solution is adding another bin—meaning a comparatively large investment and an imponderable floor space problem.

Transportation is still another consideration. Fixed-storage sugar users are dependent upon either public carrier rates and schedules or established delivery rates by refinery-owned bulk trucks. A unit container user can accomplish savings in freight by employing contract truckers or his own vehicles.

Assuming the user decides in favor of the unit container, he is again faced with the choice between a great assortment of them. Among these, best known and in most common use is the Tote bin.

All sugar refineries in the Philadelphia and New York areas have, for several years, been equipped to fill these bins and presently are allowing a substantial differential at 20c. per cwt. from bag price.

These bins are of heavy gage aluminum, air tight, and impervious. Interior corners are rounded and discharge doors open flush to bottom of bins to conform with strict sanitary codes. Most common size is 42x48x59 in. high with a capacity of 74 cu. ft. On a straight gravity fill at the refinery this unit will hold about 3,600 lb. Bins have 4½ in. under clearance for easy lift truck handling, and top corners have reinforced pads for double stacking.

Bins are filled through a 9-in. top opening, and bottom discharge door is 34-in. wide by 17-in. high—large enough for a man to enter for cleaning.

All bins are evenly tare weighed. In the metropolitan areas, Tote-bin sugar is delivered and empties returned at a freight cost per cwt. of sugar delivered—which is less than freight cost of sugar delivered in bags.

A typical operation is where the trucker goes to the refinery with 12 empty bins loaded on a flat bed trailer. Whole rig, including bins, is weighed, and truck pulls over to side of refinery, where sugar is spouted into the bins. Truck is again weighed and user is then invoiced the net weight.

At user's plant, the bins (equal to 400 bags) are unloaded and stored in less than 15 min. by a man with a fork truck. The 35 cwt. in one of these bins occupy the same space as 21 bags on a pallet.

To feed into process, bin is placed on a tilt rack that elevates the back of the bin so that it becomes a 47-deg. hopper. Sugar then is gravity-fed to a screw conveyor in the bottom of the rack. Through screw conveyor, sugar can be discharged at any desired rate and amount to any conveying system. In event of emergency, bag sugar can be dumped directly into tilt rack.

Recently, there have been two significant developments. As for the first, three large chain bakeries are installing Tote bin systems in conjunction with bulk railroad cars for handling flour and sugar. One bakery has mechanical facilities for unloading from bulk cars into the bins in the plant. The others have pneumatic systems for unloading into Tote bins.

Sugar or flour unloaded from cars can be conveyed to storage area, or can be transferred to a cross conveyor that fills one or more lines of Tote bins. Or product can go to a reversing conveyor that is arranged to fill a line of bins to the right and then reverse flow to left so attendant has time to remove full bins from one end of line and place empty bins un-

der conveyor while bins at other end are being filled.

In one case, the Tote bin method involved an investment of $40,000 against $80,000 for conventional storage bins.

Second development involves use of railroad container cars on a lease basis. In return for not making capital investment in special cars (like covered hopper cars), railroads only charge prevailing commodity rate for shipping sugar, in this case from refinery to user, and make no charge for the return empty haul. Railroads also pay lessee a mileage allowance for total mileage car travels loaded and empty.

J. F. Bertuccio, J. C. Corrigan Co., Boston, outlined these advantages of mechanical handling and storage of bulk sugar over bag handling: (1) Making extra space available for manufacturing purposes by concentrating and increasing storage facilities; (2) reducing in-plant traffic and lowering floor-maintenance costs; (3) improving housekeeping and maintaining a neater plant by avoiding sugar spillage and settling of sugar dust; (4) simplifying sanitation and acquiring higher sanitary standards; (5) eliminating possibility of contamination, since equipment is enclosed; and (6) savings in freight on bags, sugar left in empty bags, and time required to salvage bags.

Handling Liquid Chocolate in Bulk

Delivery of liquid chocolate in bulk from viewpoint of manufacturer, consumer, and transporter was reported by W. L. Newcomer, Wilbur Suchard Chocolate Co., Lititz, Pa.

The switch to shipping coatings in tank trucks presents no problem to manufacturer. His work-in-process inventory becomes his finished stock. There is no problem in conveying coating to tank truck rather than to tempering kettles or molding units—which would be his next operation were he preparing for shipment in 10-lb. cakes.

Tanks Do It

In place of molders, he must install tanks—such as the Stehling type—to hold coating for truck transporting. Tanks should be located near loading station. Water-jacketed or heated piping is necessary if loading station is some distance from tanks and if this station is exposed to low temperatures. To prevent shipping delays, production schedules must be well planned.

Coating goes into trucks at 120-130 deg. F. The loading time (average about 30 min.) depends upon location of loading dock in relation to holding tanks.

A user of molded coating, for example, receives either 500 cartons (each 50 lb.) or 120 bales (each 200 lb.) to obtain a 25,000-lb. shipment. These are moved from receiving platform to storage space, and from storage to melting kettles. Each carton or bale is opened, and each of the 2,500 cakes (10 lb.) is broken and dumped into a melting kettle.

If he is set up to receive liquid coating, he can pump 20,000 to 25,000 lb. into melting kettles in about 30 min. and eliminate above handlings.

Ideal are storage facilities for a minimum of 50,000 lb.—the equivalent of two truck loads, which should eliminate close scheduling of deliveries and delays in unloading, as well as provide insurance against running out of coating due to delivery delays.

Typical installation: Two U-shaped, partially jacketed tanks, each with a capacity of 28,000 lb.; about 14x18x9 ft. of space; two pumps (a spare for breakdowns) hooked up to a 4-in. line; and jacketed or electrically heated, wrap-around piping. Approximate cost is $13,000 to $15,000.

As for the trucker: For a short haul, a well insulated tank truck is sufficient. If truck does not have a heating unit, manufacturer must have facilities to blow hot air into truck before loading. Trucks with self-contained heating units are satisfactory for distances up to 750 miles. They should be provided with openings for scraping the sides so that a minimum of residue remains after unloading.

Advance Process Instrumentation

Automatic control instruments for measuring temperature, pressure, and flow in process operations, declared W. J. Scarlett, Minneapolis-Honeywell Regulator Co., Philadelphia, insure uniformity and good product flavor and drastically cut losses due to uncertainties inherent in manual operations and spoiled batches.

Other process variables subject to control are pH, viscosity, density, color, consistency, physical dimensions, and a host of others. Instrument makers visualize, within the foreseeable future, measurement and ultimate control of such process variables as texture, odor, flavor, and some of less tangible characteristics.

His company, he continued, has recently installed automatic controls in a large, diversified product shop—the Tuxedo Candy Co., a manufacturing subsidiary of Safeway Stores. This firm recently moved into a new building and consolidated its manufacturing operations. It applied instruments and automatic controls to virtually all production operations with exceptionally good results.

Here's how this firm went all-out on instrumentation and automatic control:

Chocolate is tank-truck delivered in liquid form at temperatures high enough so that it is a thin syrupy liquid without grain or seeds. It is pumped into Stehling tanks in an insulated, temperature-humidity controlled room for storage at a temperature slightly below receiving but high enough to prevent graining.

Room is heated by gas or steam unit, and temperature is closely controlled by electronic instrument. Temperature of tanks is closely regulated by recirculating cooling water, which passes through a cooling tower and is "trimmed off" to required temperature by direct steam injection.

In this way, tanks may be used for cooling or heating or, if occasion demands, for melting solid chocolate should the liquid form be unavailable. In addition to automatic controls, which include a circulating pump for jacket water, a multi-record strip-chart recorder provides a continuous record of temperature in all tanks.

From Stehling tanks, chocolate is gravity-fed to cooling kettles, where its temperature is again lowered. It is then pumped through electrically heated lines to drip kettles. Temperature is stabilized and chocolate is "dripped" to enrobers, where final temperature is maintained within close limits.

A cascade system is used to control temperature of the cooling and drip kettles. Here, an electronic instrument sets the index of a thermometer bulb instrument, which in turn controls hot or cold water.

Electric heating prevents freezing of chocolate in flow lines. Temperatures are closely held by means of a thermometer-bulb instrument (with a long averaging bulb wrapped around the pipes) and by controlling the electric strip heaters (also wrapped around flow lines).

Enrobers are completely automated. Chocolate is fed from drip kettles to enrober tank at constant temperature. No effort is made to control chocolate temperature directly in enrober tank. Control is indirectly achieved by regulating jacket-cooling water. Its

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INGREDIENT SPECIAL

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A Special Section of FOOD ENGINEERING, June, 1954

Two Focal Points in Additive Impasse

In Candy Plant

. . . color adds eye appeal. But now there's apprehension.

In Bake Shop

. . . coumarin played important flavor role. Now it's out.

CHEMICALS IN FOODS

Where Do They Stand?

Voluntary withdrawal of coumarin and indicated ban on certain coal-tar dyes, point to further use of systematic animal studies. Other aromatic compounds, synthetic sweeteners, thickeners face scrutiny

BERNARD L. OSER
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The spotlight has been on chemical additives in many food standards hearings of the past few years.

Some of these agents have been withdrawn from the channels of commerce by voluntary action on the part of industry. Still others, after brief suspicions that they are malefactors, are only waiting for their doomsday.

In the background of all this activity, Congress, with help of the food and chemical industries, is cooking up legislation designed to impose added controls on food additives. Truly the chemical pot is boiling.

What with all the sensational and misleading information that has appeared on this subject in news columns and popular magazines, one scarcely can blame the public for a feeling of apprehension over the safety of its food supply.

This situation was deplored by Food & Drug Commissioner C. W. Crawford when he said:

The result of all these forces has been to arouse public distrust of the integrity of staple foods to an extent far surpassing anything I have seen before in my 35 years of service. Sound nutritional education and habits have been handicapped by years. . . .

. . . I do not believe it will be enough merely to spread the truth that we have the finest and most nutritious food supply and are freer from malnutrition than any nation in history. Those who have become skeptical, and they are legion, won't be persuaded so easily.

The impression is spreading that

more rigid laws are needed to protect the public against the unseen dangers lurking in the market basket.

Let's Look at the Record

Without denying the merit of proposals that the law be strengthened by the requirement of some sort of prior notification or approval of use of new chemical additives in foods, suppose we look into a few examples of how the present provisions are operating. Perhaps, too, in certain recent enforcement actions of FDA we may see the straws in the wind.

Chemicals are permitted in foods under several sections of the Food, Drug & Cosmetic Act. Provisions governing standardized foods are quite specific in that the required or optional ingredients in the definitions and standards of identity actually name the chemicals and in some instances specify limitations on the amounts permitted.

However, chemicals that come under such categories as "harmless" or "artificial" coloring or flavoring are not specified by name. Foods containing them come under general provisions of the Act.

Special consideration [Sec. 406(b)] is given to coal-tar colors. These are only restricted to a specified list of permitted compounds, "harmless and suitable" for use in food, but must be from FDA certified batches of such colors. However they may be dissolved in harmless diluents, which are not otherwise identified.

Permissive use of chemical additives or adjuncts is implicit in the paragraph dealing with confectionery [Sec. 402(d)], which recognizes the use of "harmless resinous glaze" and "harmless nonnutritive masticatory substance" in addition to harmless coloring and flavoring.

Major section of the law applying to the presence of unspecified chemicals in foods is Section 406(a). This limits addition of "poisonous or deleterious" substances to those either required in production of the food or which cannot be avoided by good manufacturing practice.

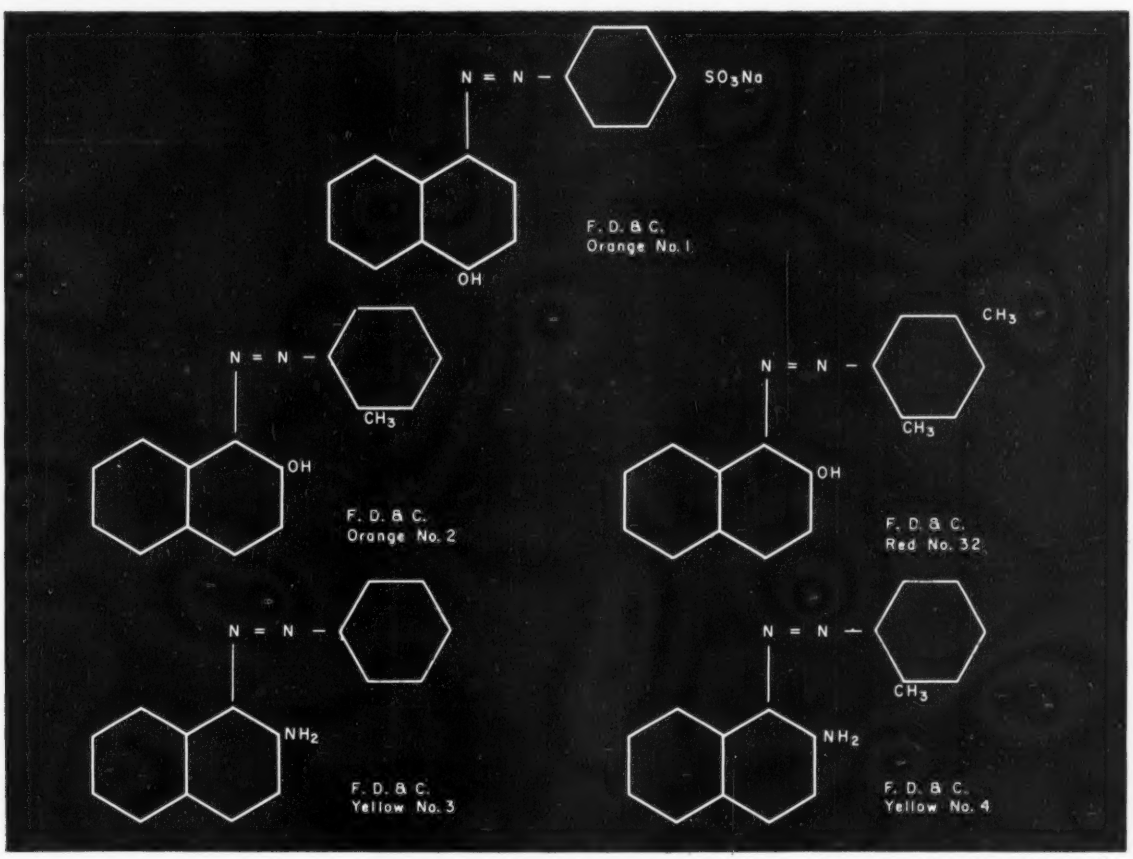
In such cases the Secretary is charged with the duty of holding public hearings and promulgating regulations setting tolerance limits, "to such extent as he finds necessary for the protection of public health." Under this section, for example, hearings were held several years ago on the necessity for, and toxicity of, various pesticidal compounds, although no official regulations have as yet been issued.

Nevertheless, through voluntary cooperative effort on the part of leading chemical and food companies—acting sometimes individually, sometimes collectively—effective control in the interest of public health has been achieved.

Voluntary Action

Recognizing that enforcement of Sec. 406(a) requires the government to assume the burden of proof that a substance is in fact "poisonous" or "deleterious", and the frequent difficulty of establishing such proof beyond reasonable doubt, manufacturers have in some instances voluntarily stopped use of certain chemicals even when the evidence against them was only of a suspicious nature—i.e., not weighty enough to constitute proof.

An instance was the discontinuance by the milling industry, and particularly by the licensor of the process, of the treatment of flour with nitrogen trichloride to induce maturation (agenizing). This action subsequently was made mandatory by omission of nitrogen trichloride treatment as an



FIVE coal-tar colors in question. Note similarity in their formula.

option in the definition and standards of identity for wheat flour.

Nitrogen trichloride now has been largely supplanted by chlorine dioxide, but only after extensive toxicological tests revealed absence of undesirable properties in the flour so treated.

Coumarin an Example

Recent history of coumarin is of particular interest, not only because of the decision reached as to present status of this compound, but because of the fate these events portend for other compounds with a long history of apparently safe use.

As the readers of FOOD ENGINEERING have been informed, new evidence of the toxicity of coumarin to laboratory animals was made known to FDA about a year ago by a group representing principal producers of this compound.

These people offered to withdraw this time-honored flavoring ingredient from sale for all food uses, an action which earned the commendation of FDA "for their action in the public interest."

No cases of human illness have ever been traced to use of coumarin as a flavoring agent. Nevertheless this precautionary measure of voluntary withdrawal was taken without imposing any burden of proof under Section 406(a) on the government.

It is doubtful whether new legislation requiring prior approval could have provided more prompt or effective relief in such a situation. For, by virtue of its three score and ten years of apparently safe use, coumarin would not be regarded as an additive "not generally recognized, among experts qualified by scientific training and experience to evaluate the toxicity of such substances, as having been adequately tested so as to show that it is safe for the use for which it is intended" (to quote the language of the Miller Bill, H.R. 4901).

That no serious hazard to public health was involved could have been inferred from the fact that FDA did not proceed under Section 406(a) to seize products containing coumarin. On the contrary, it has allowed these products, as well as existing stocks of the flavoring, to disappear gradually from the market.

Banned for Chocolate

About nine months after FDA's announcement (IHEW-A14), a short public hearing was held for the purpose of removing coumarin from the list of optional flavoring agents in the definitions and standards of identity of cocoa and chocolate products. The final order declared that this flavoring by reason of its toxic properties, is not a suitable optional ingredient of this class of products and decreed its deletion from the standard. The order was issued on Mar. 5, 1954, to be effective on June 3, 1954.

In addition, a statement of policy was made in which it was announced: "The Federal Food, Drug & Cosmetic Act defines food as adulterated if it contains any added poisonous or deleterious substance not required in the production or avoidable in good manufacturing practice. Food containing coumarin added as such, or as a constituent of tonka beans or tonka extract will be regarded as adulterated under this provision of the law."

Presumably, therefore, FDA is now prepared to prove the poisonous nature of coumarin in the event of a seizure under Section 402(a)(2). It is important to note that, whether the use of coumarin, or any other additive, entails the possibility of injury to health is irrelevant under the FDA concept of an added poisonous substance. The cardinal point is whether such a substance, for which a tolerance has not been duly established, is present at all, not whether the food containing it may or may not be harmful. Difficulty, if not futility, of defining a poison outside of a given context of use—i.e., without considering the dose, frequency, and manner of administration—has been discussed elsewhere by the writer.*

What About Other Solvents?

Statement of official attitude and implied intention of FDA toward foods containing coumarin poses several interesting questions. It excludes addition of coumarin as such and in the form of the principal natural source, the tonka bean and its extract.

But does the term "extract" apply only to the alcoholic solution, as it has been interpreted in connection with other flavoring extracts?

If so, what about other solvent preparations of the tonka bean? And what about the many other natural sources of coumarin, especially sweet grasses? Are they excluded? Will food and beverage manufacturers be guided by the letter or by the spirit of this statement of policy?

Coumarin was presumed to be safe, and foods containing it not hazardous (the latter, in any case, being still a sound presumption), until contrary laboratory evidence practically was stumbled upon. It now is reasonable to anticipate that as a result of more systematic animal investigations, other aromatic compounds, natural and synthetic, will be found, under certain experimental conditions, to have toxic properties precluding their continued use in foods.

This situation is bound to prevail as long as the determination of what are "poisonous or deleterious substances" is made administratively without regard to their proposed or actual use. Somewhat belatedly the essential oil and flavoring extract manufacturers are beginning to read the handwriting on the wall.

Colors Suspect, Too?

Another class of chemical additives, assumed to be harmless and suitable for use in foods, are the permitted and certified coal-tar colors.** Certain of these now have come up for scrutiny, with the result that three (Orange No. 1 and 2 and Red No. 32) may soon be banned and two more (Yellow No. 3 and 4) may share a similar fate. Early history of adoption of these substances as food colors, particularly the toxicological basis for regarding them as harmless, is clouded in obscurity. The fact that they had been used for years without apparent harm undoubtedly contributed to their inclusion in the original and subsequently expanded lists of permitted "coal-tar colors".

A recent episode of diarrhea in children pursuant to their eating candy containing an excessive proportion of Orange No. 1, focused attention on possible harmfulness of the permitted colors, particularly those related to azonaphthol or azonaphthylamine.

Following this incident, studies were conducted by FDA on animals and human subjects, in which dose levels considerably in excess of those corresponding to practical use, could be demonstrated to induce cathartic effects. Dogs, but not rats, responded.

A public hearing was held on Jan. 19, 1954, with a view to possible de-listing of these food colors. It was revealed that, aside from the diarrheal effect, no evidence of human injury was known to FDA.

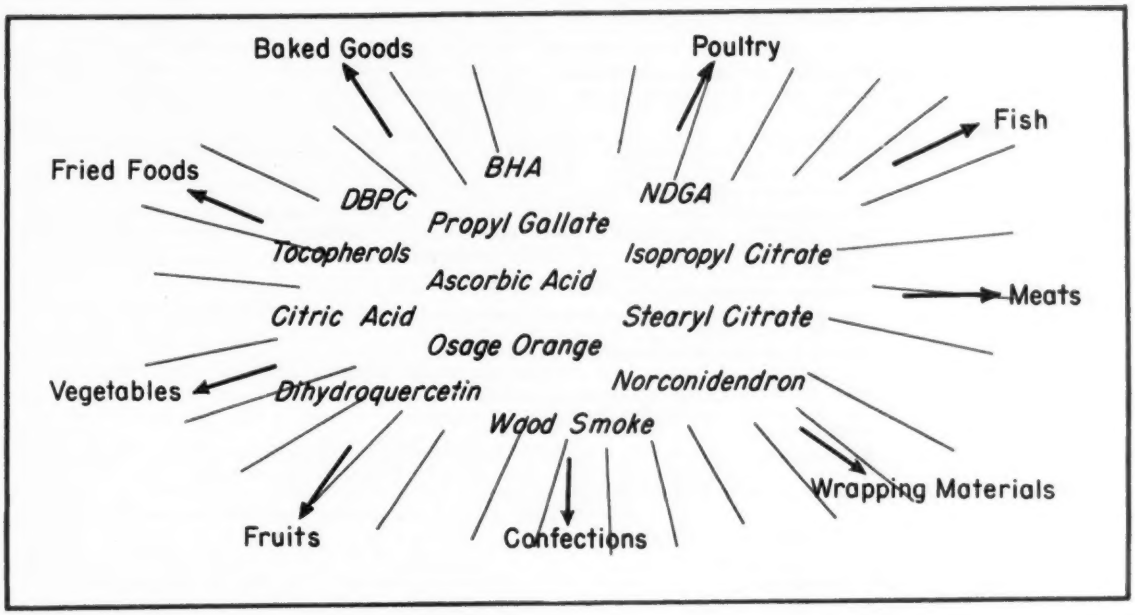
These observations present several interesting questions:

1. If the yardstick for determining what is "harmless" is to be changed, what is it now to be?
2. Will an adverse effect of exces-

(Turn to page 134)

* Oser, B. L., "Can a Poison Exist in a Vacuum? A Discussion of Section 406(a)." *Food Drug Cosmetic Law Journal*, 8, 11, 1953.

** The author elsewhere has expressed his objection to use of this designation despite its official status. Chemists should beware of the semantic impact of such terminology on the lay mind. Compounds derived or capable of being derived from such crude material as coal-tar need have none of the objectionable or deleterious properties of the crude material; as a class they have nothing in common chemically or pharmacologically, nor, in fact, in any respect except perhaps their original source.



Expanding Uses of Antioxidants

New products, and wider applications for established ones are making news. But prevention of rancidity in the various fatty foods still predominates

A. L. TAPPEL
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Most recent developments in the field of antioxidants have been directed toward improvement of stability and acceptability of a wide variety of foods ranging from candies to mushrooms.

Emphasis is on prevention of oxidative deterioration by careful study and selection of proper antioxidants followed by their applications to foods in the most effective manners.

Oxidative Fat Rancidity

One of the biggest problems in the preservation of fats and fatty foods is rancidity caused by oxidation of unsaturated fats, producing aldehydes and ketones that have strong and undesirable odors and tastes. Many of the prooxidants and catalysts indicated in the accompanying figure are part of the storage environment of oxygen labile fats of food products.

Besides use of antioxidants, other means of control should be adopted where possible. Natural fats that are more saturated, or hydrogenated fats, should be used in preference to unsaturated ones if feasible.

Reduction or elimination of oxygen by use of airtight containers and vacuum, or inert gas packing, can solve many oxidative problems. Lower processing and storage temperatures, and reduction of light intensity by use of opaque or brown transparent packages, are important in preventing oxidative rancidity.

Antioxidants can supplement these precautionary measures to give maximum stability. Heavy metal contamination in trace quantities is often very difficult to eliminate, as in the case of refined soybean oil. Here antioxidants have provided the required stability.

In meat, poultry, and fish, where heme pigments act as catalysts, there have been notable successes in applying antioxidants.

Two Kinds

Antioxidants applicable for stabilization of unsaturated fats are of two general types:

1. Phenolic such as butylated hydroxyanisole (BHA), nordihydroguaiaretic acid (NDGA), propyl gallate, and the tocopherols. These inhibit fat oxidation by reacting with free radical intermediates of the oxidizing fats.

2. Synergists that have no direct effect upon fat oxidation but supplement the primary phenolic antioxidants, usually by forming stable chelates with trace metal contaminants, thereby removing these metals as fat oxidation catalysts.

Citric acid is the most widely used synergist at the present time. Ascorbic acid is another that is useful in some cases of fat oxidation. Besides being a synergist for fat antioxidants, this acid has found wide application in prevention of oxidative browning and flavor changes in fruit juices, mushrooms, sauerkraut, and other food products.[1] Important properties and permitted concentrations of these six food antioxidants are listed in Table I.

Because no one product possesses properties that make it ideal for a wide variety of applications, mixtures of antioxidants are very popular. For example, a mixture of 20% BHA, 6% propyl gallate, 4% citric acid, and 70% propylene glycol has several advantages. It is readily soluble in fats.

TABLE I—PROPERTIES of the Most Important Antioxidants

Antioxidant	Important Properties	Federally Approved Concentrations
Butylated hydroxyanisole (BHA)	Hindered phenolic antioxidant. Fat soluble, water insoluble. Stable during cooking, frying, and baking processes. Stable to mild alkali.	0.02% may be used with or without 0.01% propyl gallate or NDGA and with or without 0.005% citric acid.
Nordihydroguaiaretic acid (NDGA)	Polyphenolic antioxidant. Solubility in fats is about 0.5%. Best dissolved with aid of carrier solvent. Insoluble in water. Unstable to high temperatures and mild alkali.	0.01% NDGA may be used with or without 0.005% citric acid as synergist.
Propyl gallate	Polyphenolic antioxidant. Solubility in fats is less than 2.0%. Best dissolved with aid of carrier solvent. Soluble in water. Unstable to heat and mild alkali. Discolors in presence of iron unless a chelating agent such as citric acid is added.	0.01% propyl gallate may be used with or without 0.005% citric acid synergist.
Tocopherols	Vitamin E group is physiological antioxidant naturally occuring in plants and animals. Soluble in fats, insoluble in water.	0.03% tocopherols.
Citric acid	Synergistic antioxidant. Solubility in fats is less than 0.005% but with aid of carrier solvent sufficient amounts can be dissolved for use in fats. Soluble in water.	0.005% citric acid.
Ascorbic acid	Ascorbic acid (vitamin C) is a reducing compound that naturally occurs in plants and animals. Freely soluble in water, insoluble in fats.	Consult standards of identity for product in question.

TABLE II—INCREASE IN STABILITY Resulting From Addition of Antioxidant Mixture* Varies With Products

Foods Tested	Stability (Days) Schaal Oven Life, 145 Deg. F. Unstabilized	Stabilized	Stability Increase (Percent)
Potato chips	1	33	3,200
Crackers	7	25	257
Pastry	3	24	700
Butter	15	54	260
Wheat germ meal	6	54	800
Corn meal	36	94	161
Pecans	28	40	43
Walnuts	35	55	57
Lard film on:			
Wax paper	4	7	75
Paperboard	1	5	400
Pastry premix in:			
Parchment paper	5	14	180

* Mixture comprised BHA (20%), propyl gallate (5%), citric acid (4%), propylene glycol (70%). Data from Bentz, R. W., O'Grady, T. J. and Wright, S. B. Food Tech. 6, 302, 1952.

TABLE III—EFFECT of Different Antioxidant and Synergistic Combinations on Fat of Pie Crust Held at 143 deg. F.*

Antioxidant	Days to Attain Peroxide Value Of 60
Control, no addition	4
NDGA (0.01%) + citric acid (0.004%)	7
Propyl gallate (0.006%) + citric acid	7
BHA (0.02%) + citric acid	25
BHA + NDGA + citric acid	21
BHA + propyl gallate + citric acid	23

* Mahon, J. H., and Chapman, R. A. J Am. Oil Chem. Soc. 31, 108, 1954.

The powerful polyphenolic antioxidant, propyl gallate, is in synergistic combination with BHA and citric acid. This mixture has carry-through properties due to the presence of heat-stable BHA. Effectiveness of this synergized mixture for stabilizing fatty foods is illustrated by data in Table II.

This mixture emphasizes several important factors influencing effectiveness of antioxidants:

1. They must be dissolved to be effective. NDGA, propyl gallate, citric acid, and ascorbic acid should be dissolved in a suitable carrier solvent such as propylene glycol for application to fats.

2. Synergists should be used because they greatly increase effectiveness of the more costly phenolic antioxidants.

3. For fats used in baking, cooking, or frying, a heat-stable antioxidant such as BHA should be incorporated for important carry-through properties.

The necessity of using a heat-stable antioxidant is well illustrated in Table III, which shows that only BHA gives a large increase in stability of pie crust. In the baking process NDGA and propyl gallate are destroyed and even some BHA is lost by vaporization.

Antioxident treated papers are an important development because wrapping papers often contain heavy metal catalysts and they also soak up fat and thus provide a contact between the fat and air.[2, 3]

In combating the prooxidant effect of salt, antioxidant-coated salt is another significant development.[4]

Looking to Future

Among the new antioxidants proposed for food use are two that should find wide acceptance. Di-t-butyl-p-cresol (known as DBPC and 1,6-Di-t-butyl-4 methyl phenol) at present is widely used as an antioxidant for non-edible fats and hydrocarbons. Following extensive toxicological tests, this product recently has been approved by FDA for use in foods.

DBPC is a hindered phenol with carry-through properties similar to BHA. Because it has the properties required of a food antioxidant and can be produced at a relatively low cost, this antioxidant should find broad employment in the food field.

To circumvent difficulties presented by the fat insolubility of citric acid, its esters, isopropyl citrate and stearyl citrate, have been prepared and evaluated as synergistic antioxidants. Both esters proved to be effective in stabilizing vegetable oils.[5]

Possibilities of obtaining antioxidants from cheap raw materials are interesting from the economic viewpoint. Norconidendron, a polyphenolic antioxidant that can be prepared from sulfite waste liquor of the western hemlock, is undergoing toxicological study.[6] Dihydroquercetin, isolated from the bark of the Douglas fir and Jeffrey pine, has antioxidant properties similar to propyl gallate.[7]

Also, the osage orange fruit is known to contain a strong antioxidant.[8]

In the quest for new and more powerful products it should not be forgotten that the vitamin E group, the tocopherols, are the physiological antioxidants in nature.

Recent surveys have shown that the national diet incorporates less than the recommended amounts of these vitamins. Therefore, food technologists should make every effort to maintain a high tocopherol content of foods by the intelligent application of synergists to vegetable oils and the supplementation of animal products and other prepared foods with tocopherol concentrates.

Nature's Antioxitants

The more profitable use of naturally occurring antioxidants should not be overlooked. For example, addition of ascorbic acid (vitamin C) to frozen cured pork has a beneficial effect upon the color and fat stability as shown in Table IV. Here, it acts synergistically with naturally occurring tocopherols in inhibiting rancidity.

There is evidence to indicate that the same two vitamins in synergistic combination are responsible for the stabilization of fats in all living animals. Man should take note of the packaging and stability problems which are so well solved in nature!

Examination of the well-known fat stabilizing effect of smoking has revealed the powerful antioxidant properties of smoke due to its content of phenolic compounds.[9] The antioxidant properties of the spices, especially Rosemary and sage, help explain their food preservation action.[10]

Recent research on soybean oil reversion has emphasized the practical importance of obtaining basic information on the fat oxidation problems involved. With all aspects of the problem duly considered, specific antioxidants for stabilization are being designed and tested.

Presently, the industry successfully is using citric acid and sorbitol as chelating agents for removal of trace quantities of iron and copper. Table V shows the effectiveness of sorbitol.

Animal Products

The problems of fat oxidation in the animal products, meat, poultry, and fish, are of great economic importance. Fatty fishes, turkeys, and pork that contain highly unsaturated fats have presented the great difficulties.

Unfortunately, application of antioxidants to these products have been of limited success. For instance, addi-

(*Turn to page 133*)

TABLE IV—EFFECT of Ascorbic Acid and Salt on Color and Rancidity of Frozen Ground Pork*

Additions	Peroxide Value	Surface Appearance	Odor and Flavor
Ascorbate, 0.1%	0	Increased dulling	...
Control, no addition	0	Slightly dulled	...
Nitrite, 0.02%	0	Brownish gray	...
Ascorbate and nitrite	0	Bright pink	...
Salt, 2%	11.5	Gray	Off-flavors and odors
Salt and ascorbate	13.3	Gray	Off-flavors and odors
Salt and nitrite	8.1	Pink	Cured meat flavor and color after cooking
Salt, ascorbate and nitrite	9.0	Very bright pink	Definite cured meat flavor and color after cooking

* Watts, B. M., and Lehmann, B. T., Food Tech. 6, 194, 1952.

TABLE V—SORBITOL Improves Flavor and Oxidative Stability of Soybean Oil*

Additions	Flavor Scores After 3 Days at 141 Deg.	Peroxide Values (A.O.M. Conditions 8 hr.)
Sorbitol (0.01%)...	7.5	10.8
Sorbitol-iron.....	6.5	18.5
Control.....	5.8	33.5
Iron (3 ppm.).....	4.0	62.4

* Dutton, H. J., Evans, C. D., and Cowan, J. C., Trans. Amer. Assn. Cereal Chem. 10. 116, 1953.

TABLE VI—ANTIOXIDANT MIXTURE Greatly Increased Stability of Frozen Creamed Turkey*

Antioxidant	Peroxide Values After 0 Months At 0 Deg. F.	Peroxide Values After 6 Months At 0 Deg. F.	Off-flavor Scores After 0 Months At 0 Deg. F.	Off-flavor Scores After 6 Months At 0 Deg. F.
Control, no addition	37	53	2.9	4.4
In preparation of sauce only	19	21	1.0	0.7
To cooking water only	3	3	0.5	0.2
To both cooking water and sauce	4	3	0.6	0.6

* Mixture comprised BHA (20%), propyl gallate (6%), citric acid (4%), propylene glycol (70%). Data from Lineweaver, H., Anderson, J. D., and Hanson, H. L., Food Tech. 6, 1, 1952.

TABLE VII—ASCORBIC ACID Improved Color and Flavor of Glass- and Tin-Packed Mushroom Buttons*

Container	Ingredients Added	After Processing: Color	After Processing: Flavor	After 3 Months Storage: Color	After 3 Months Storage: Flavor	After 24 hr. Exposure To Air: Color
Glass 4 oz.	Salt, 40 gr.	Dark, muddy gray	Oxidized	Very dark, very muddy gray	Oxidized, flat, old	Amber, reddish-tan
	Salt, citric acid 1.6 gr.	Slightly dark gray	Slightly oxidized	Dark, muddy gray	Less oxidized Off flavor	Dark tan
	Salt, citric, 150 mg. ascorbic acid	Good, tan	Good flavor	Fairly good, tan	Fairly good	Slightly greenish yellow
	Salt, 150 mg. ascorbic acid	Fairly good, tan-gray	Good flavor	Fairly good, tan-gray	Fairly good	Yellow tan
Tin 4 oz.	Salt, 40 gr.	Dark, muddy gray	Oxidized, old	Slightly dark, gray	Oxidized, flat	Dark amber
	Salt, citric acid, 1.6 gr.	Slightly dark, gray	Less oxidized	Very slightly dark throughout	Slightly oxidized	Amber
	Salt, citric, 150 mg. ascorbic acid	Tan	Good flavor	Good, yellowish tan	Good	Yellow
	Salt, 150 mg. ascorbic acid	Tan	Good flavor	Good, yellowish tan	Good	Yellow tan

* Bauernfeind, J. C., Smith, E. G., and Siemers, G. F., FOOD ENG. 24, 88, Dec. 1952.

MONOSODIUM GLUTAMATE

Unique Flavor Enhancer

Used in small amounts, it brings out naturally occurring flavors of a large number of foods. Also suppresses certain undesirable notes

★ *The following article was specifically prepared for "Food Engineering" by the Glutamate Manufacturers Technical Committee comprised of representatives of the various producers.—The Editors*

SPECIFICALLY monosodium glutamate is the 99 +% pure sodium salt of glutamic acid, one of the amino acids of which protein is composed.

It has the appearance of common table salt or sugar and maintains its flavor-improving characteristic at either high or low temperature.

In commercial manufacture, glutamate* is produced by separating L-glutamic acid from the vegetable or cereal proteins in which it naturally occurs. Because basic raw materials must be high in glutamic acid content, production in this country has been limited to wheat gluten, corn gluten, and sugar beets.

Processing steps in the manufacture are:

1. Acid or alkaline hydrolysis (depending on the raw material used).
2. Separation and purification of glutamic acid.
3. Conversion to glutamate.
4. Crystallization and drying.

* For purposes of simplicity, the accepted abbreviation, "glutamate," is employed in this article's references to monosodium glutamate (MSG).

Why It Is Used

The product has the unique ability of improving desirable food flavors without adding any flavor of its own. Thus, bringing out or reinforcing the naturally occurring flavors, the process has been described as an enhancing, blending, and rounding out of flavors.

As specific examples, it greatly reinforces the natural flavor of chicken, brings out the desirable fresh-picked flavor characteristics of vegetables, and, in corned beef, enhances the sweet flavor of the meat itself.

Glutamate also suppresses certain undesirable flavor notes, such as earthiness in potatoes and fishiness in lima beans. In short, glutamate imparts "mouth feel" making the food more "interesting".

It is equally effective in maintaining the flavor of processed foods where there is, necessarily, a considerable time lapse between preparation and consumption. Canned products containing it are more tasty, and frozen foods to which glutamate has been added prior to freezing hold their flavor longer in storage. The overcooked flavor found in food kept hot on a steam table can be eliminated by its use.

In most commercial applications, glutamate neither requires a special technique for its use, nor special processing steps. Wherever possible, it should be added at the same point in the process where spices, sugar, and/or salt are added.

In many plants, these items are weighed out together and added to the batch as a unit. This method of addition is used for such products as canned soups, stews, sauces, chili, and all batch-type canned or precooked frozen food products.

The method also is applicable to meat products that contain spices and seasoning, and to meat-pickling brines for curing hams and bacon. In all of these cases, the glutamate goes in along with the spices and seasoning ingredients and is dissolved and mixed into

Where to Use Glutamate

Product	Amount
Meat	
Beef, veal, lamb, pork (fresh, canned or frozen)	2½ oz./100 lb.
Hamburger, pork sausages (fresh and smoked), liver sausage, franks, bologna	2½ oz./100 lb.
Meat loaves and spreads	3 oz./100 lb.
Hams, bacon, shoulder, butt	1 oz./gal. of pumping or stitching pickle. (Use 1 lb. to 35–40 lb. salt in dry cure.)
Luncheon meats	2½ oz./100 lb.
Meat and gravy	2½ oz./100 lb.
Stews	2½ oz./100 lb.
Chili	2½ oz./100 lb.
Corned beef hash	2½ oz./100 lb.
Meat balls and spaghetti	3 oz./100 lb. meat
Chip steaks	2½ oz./100 lb.
Meat pies	3 oz./100 lb.
Poultry	
Dressed poultry, (fresh or frozen)	2½ oz./100 lb.
Canned whole chicken (with butter sauce)	2 oz./100 lb chicken
Canned whole chicken (with plain broth)	2 oz./100 lb. chicken
Canned boned chicken	2 oz./100 lb.
Canned boned turkey	2 oz./100 lb.
Canned chicken fricassee	2½ oz./100 lb.
Chicken ala king (fresh, canned or frozen)	2½ oz./100 lb.
Chicken broth (concentrated)	1½ oz./10 gal.
Chicken and turkey pies	2½ oz./100 lb.
Seafood	
Fresh, canned or frozen	2½ oz./100 lb.
Fillets and steaks	2½ oz./100 lb.
Shrimp, scallops, oysters, crab, etc.	2½ oz./100 lb. edible meat
Sardines, canned	
In tomato paste	3 oz./100 lb.
In mustard sauce	2 oz./100 lb.
In oil	2 oz./100 lb.
Salmon	2½ oz./100 lb.
Tuna, canned	2 oz./100 lb. fish

the batch with no additional processing steps.

Because it is a comparatively expensive ingredient, it generally is not advisable to add glutamate to the brine tank, where spills occur in normal operations. A dispensing unit is generally used for measuring it into cans as they pass between the filling and closing machines. The glutamate can be added either in tablet or crystal form or as a solution, depending upon the type of dispensing machine best suited for the particular operation.

All three types of machines can be adjusted to vary the amount added to meet specific requirements. In addition, sugar and/or salt can also be incorporated into the tablet, or mixed with the crystals.

Liquid dispensing machines generally use a small volume of a fairly concentrated solution. As these units are geared to the production line, their operation is automatic regardless of the speed of the line.

The solution-dispensing machine also is used for incorporating glutamate into frozen vegetables just prior to the time individual packages are wrapped.

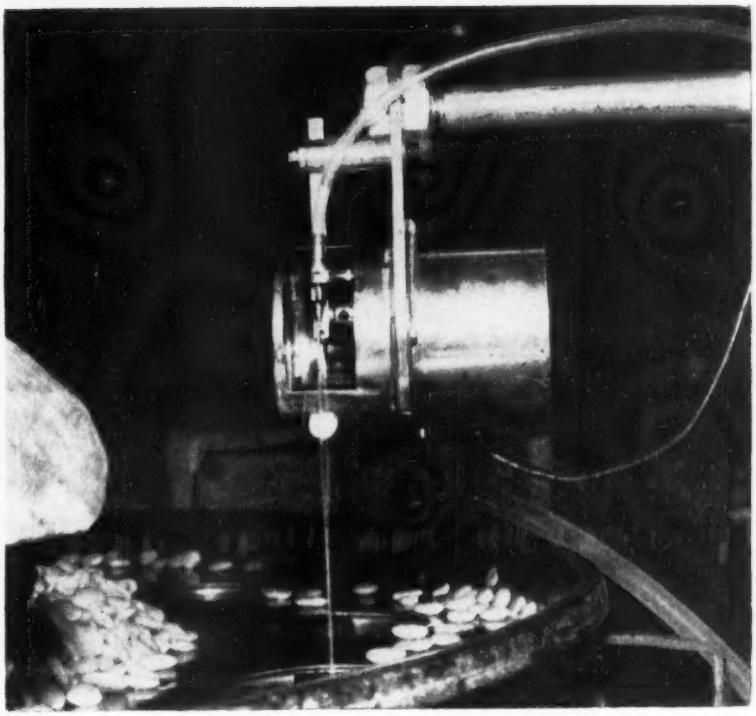
Further, it can be adapted for adding the solution to canned fish, seafood, and other packaged or canned products where difficulty is experienced in attaining even distribution of the agent before packaging.

In products such as dried soup mixes, seasoned meat tenderizers, seasoning mixes, etc., the glutamate is dry-blended with the other ingredients, thus requiring no special attention.

With some items, special techniques are required. In the case of fresh poultry, for example, product is dusted into the cavity or sprinkled on the cut pieces. Steaks, chops, and the like, also are dusted with it, after which it is rubbed into the meat to facilitate dissolving in the juices. Glutamate should be added to potato chips and other fried snacks along with the salt after frying.

Use of this agent is recommended in all meat products, poultry and related products, seafoods, vegetables, soups, gravies, sauces and salad dressings, some dairy and cereal products, and in most spice and seasoning mixtures.

Food products not improved by glutamate are relatively few in number, the exceptions being confectionery or sweet items, some baked goods, fruit, fruit juices, and beverages.



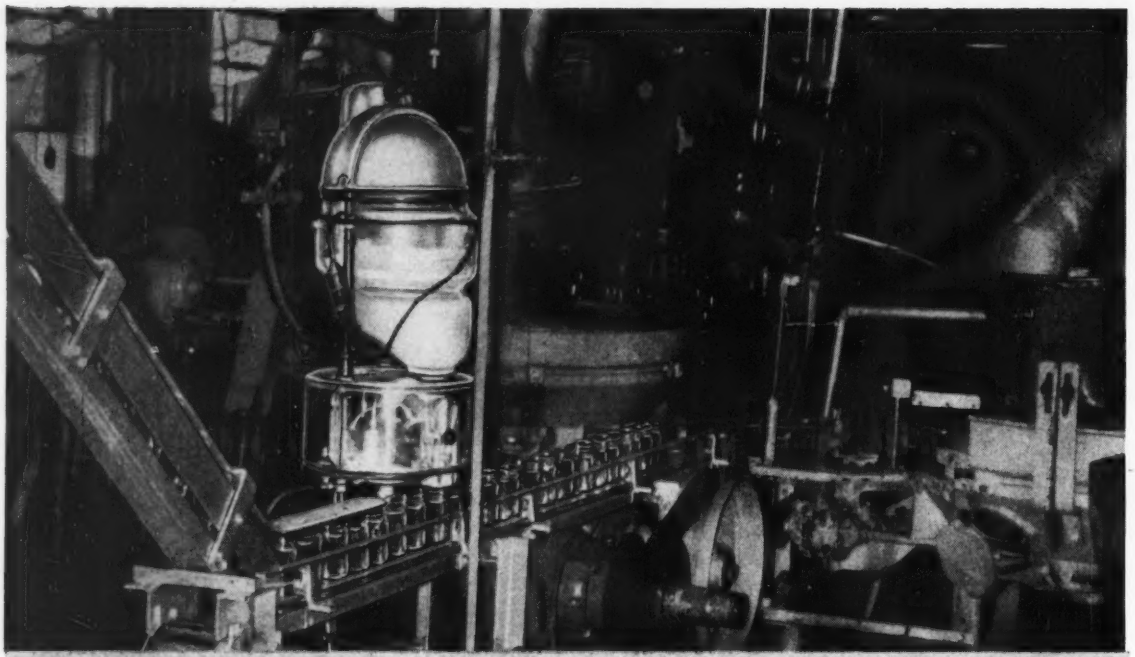
Dispensing Into Frozen Vegetables

Small portion of glutamate solution is added to each package during filling. Other dispensers drop tablets or crystals into cans before closing.

and in What Quantities

Tuna pie	2½ oz./100 lb.
Fish pastes	4 oz./100 lb.
Breaded seafood	2½ oz./100 lb. (Preferably added to wet wash.)
Flavorings and Seasonings	
Spice blends	Variable
Bouillon cubes and pastes	Variable
Sauces	1 oz./5 gal.
Cereals and Related Products	
Cheese crackers and tidbits	1½ oz./100 lb. finished product
Popcorn and potato chips	1 lb./25 lb. salt
Dressings	
Mayonnaise, French and salad	2 oz./10 gal.
Pickles and Other Acid Foods	
Dill and sour pickles	1 oz./100 lb.
Sauerkraut	1 oz./100 lb.
Cheese Dishes	
Welsh rabbit or cheese sauce	1½ oz./20 gal.
Macaroni and cheese	1 oz./40 lb.
Soups and Chowders	
Concentrated	1½ oz./10 gal.
Ready to serve	1½ oz./20 gal.
Dehydrated	6 lb./100 lb. dry mix

Vegetables (Fresh, Canned or Frozen)	% by Weight
Asparagus	0.20
Beans, snap	0.15
Beans, wax	0.15
Broccoli	0.15
Brussel sprouts	0.15
Carrots	0.25
Cauliflower	0.15
Corn, cream	0.15
Corn, whole	0.20
Lima beans, baby	0.15
Lima beans, Fordhook	0.15
Mixed vegetables	0.15
Mushrooms	0.20
Peas	0.25
Potatoes	0.10
Spinach	0.20
Tomatoes	0.15



DISPENSING bulk salt to containers on filling line is precise, economical method of product-salting.

TAILORED SALTS

Provide Many Plus-Values

Basic research to develop functional salts that exactly suit processes and products is paying off—with 6 recently developed types

R. A. SIMPSON
Food Technologist, Morton Salt Co., Chicago

Like long-established concepts, that basic food ingredient—salt—also is responding with a "new look" in this tradition-shucking atomic age.

True, universal appeal and necessity for natural salt in the diet have stood it in good stead since the dawn of history—and undoubtedly will through many more milleniums. But today's keen urge to understand and improve has also hit salt researchers. And results of their work already have established the fact that—

▶ **Salt can be modified to offer the food processor unusual extra benefits other than the basic seasoning and preserving functions.**

Witness some of the "tailored" salts that quietly have appeared in industry in the postwar years.

There is "R.G.", a fine flake salt incorporating an antioxidant that retards rancidity in deep-fat frying. . . "Firm-a-Salt", which includes built-in calcium sulphate to 'firm' canned whole tomatoes and potatoes. . . And the new ultra-high purity salts that hold trace elements below the point that could influence delicate flavors in products such as butter or cheese.

Actually, the problems that are being solved by these special salts long have been known, and salt technologists were somewhat aware that their products might be made to cope with them. But it took the postwar climate and its new research tools to launch this needed program.

In approaching the broad food picture, two stages seemed logical: First, there had to be a systematic review of where salt is used in food processing and attendant problems that might be linked to this ingredient. A specific product then could be developed either to improve on the application or actually enhance the process. Currently this stage is well underway.

Second phase in the program, of course, will be culling of the developments with an eye to their standardization—broad use and low-cost production being ultimate benefits.

Three Possible Routes

Researchers discovered that developing of these new, specialized salts could take place via one or a combination of three routes:

1. *Improving the purity*—perfection of certain refining techniques could lead to products with repressed trace-element content.

2. *Adapting screen size*—closer control of particle size to precise values could lend definite advantage to many products and operations.

3. *Building-in additives*—incorporating small proportions of other ingredients often enhance or give unusual plus-value to performance of the salt.

To get an idea of the purity problem, let us briefly consider where salt

comes from and how it is made.

There are three main sources of salt in North America: (1) Mining—rock salt; (2) salt seas—solar salt; and (3) salt wells—crude brine. These products may be used in their unrefined form or may be further processed.

Crude brine almost always is processed to eliminate impurities and remove water, which obviously would be costly to ship. Called for is evaporation in either a vacuum pan or a grainer pan. The former produces granulated salt; the latter, flake salt.

Therefore, we have the following broad types of salt which can be used by the food processor: Rock, solar, granulated, and flake.

First two are unrefined, other than screened, and are used where attention to purity and insolubles is not of primary concern.

Most food salt, therefore, is either granulated or flake. Normally, the brine from which these types are evaporated has impurities present in the form of other salts and some insolubles that are found in natural salt deposits and are removed during refining. However, certain soluble impurities such as calcium chloride or sulfate manage to cling tenaciously in minute quantities through the rigorous processing.

Getting rid of these impurities has involved a very tedious, carefully controlled technique of chemically treating brine prior to crystallization. Recently, diligent research has developed a way to make this operation commercially feasible.

Ability to produce straight sodium chloride crystals of over 99.9% purity commercially has led to many special advantages. Calcium content, for example, has been reduced below the point where it subtly affects delicate flavors.

Further, high purity has made it possible for low-cost salt to meet the rigid tolerances set by a growing number of processors in relation to such elements as copper and iron in salts used in food prone to oxidation. Most of these requirements specify below 2 ppm. for each element, and high-purity salt ("999") strains metal traces well within these limits.

Added to this new purity standard is the fact that most salt is used in amounts below 2% in a formula. Effect of these highly limited trace elements is even further minimized.

Intense research in the physical and chemical behaviour of salt, as influenced by particle size, indicated that here, also, was a rewarding area for improving its function.

For example, finer size aids solubility. But, it has long been known that fine salt produces an undesirable "channeling" in brine tanks. Study of this problem from the physical-chemical standpoint showed that an optimum particle size would provide maximum solubility without channeling.

Another aspect is relation of salt-particle size to density in a dry mixed product. By controlling size it is possible to establish a definite weight per cubic foot—permitting tailoring to the requirements of the mix as well as to continuous blending equipment.

The following methods influence screen sizes:

1. Regulation of crystallization in evaporators.
2. Screening fines from production to the exact size.
3. Mechanical pulverization.

Normally, the grainer crystals are of the larger size and offer clarity and perfection in appearance that make them ideal for surface-sprinkle applications, such as on crackers or rolls. Screened particles offer intermediate down to fine size and are used as normal seasoning material for soups and other fluid foods.

Pulverized, or micron-sized, powdered salts offers advantages similar to sugar in this form for such things as toppings and icings.

Most intriguing in the developmental program, however, is the concept of "building-in" extra characteristics through combining chemical additives with salt crystals.

One of the first and certainly most publicized "built-in" items was iodized salt. This involves an extremely accurate mix-in of a tiny portion of potassium iodine. Influence of this product in controlling goitre is already medical legend.

Another well-established additive has been a small percentage of magnesia carbonate, which adheres to the salt cubes and keeps them free running under adverse humidity conditions.

In broadly approaching the possibilities of such additives, salt researchers found four basic paths open:

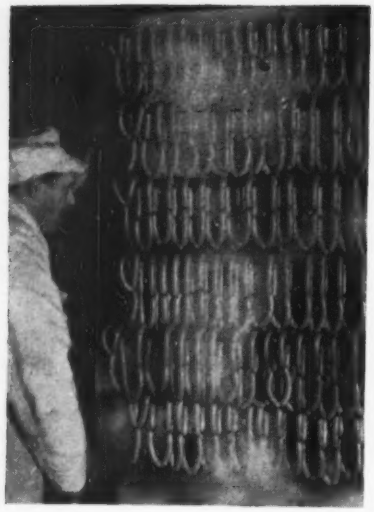
1. To influence physical properties of salt crystals.
2. To enhance natural seasoning aspects.
3. To favorably affect product.
4. To meet specific problems of food processes.

Essentially, additives of the first category are employed either to in-

(*Turn to page 130*)

SALTS AND THEIR USES

Designation	Description	Uses
"999"	Granulated 99.9% pure	Canning and food seasoning
Purex	Kiln-dried evaporated, controlled size	Water softening and brine making where high quality, 100%-soluble salt is desired
Rock and solar	Various sizes and grades	Low-cost water softening and brine making, removing vegetable peels by hot brine bath
K.D. granulated	Kiln-dried grade granulated	Grading, pickles, meat packing, water softening, fish, soft drinks, etc.
Formula 20	Granulated with additive	Especially for curing meat casings
Bakers A	Graded and screened	All baking requirements
Flake	Carefully screened and graded in various sizes	Butter, cheese, flour mixes, peanut butter, soup bases, cracker topping
R.G.	Fine flake salt with anti-oxidant added	Potato chips, shoestrings, French fried potatoes, nuts, etc.
Pretzel	Specially graded	Pretzels
Popcorn	Screened flake salt	Popcorn
Firm-a-salt	Granulated with calcium sulfate added	Canning white potatoes, whole tomatoes
Plain tablets	High purity salt pressed into tablet size, 5-400 gr.	Various types of canning
Anti-struvite tablets	Sodium hexamaphosphate and salt	Seasoning and eliminating struvite in fish
Ascorbic acid tablets	Salt tablets and ascorbic acid	Mushroom canning
$CaCl_2$ tablets	Calcium chloride and salt	Canning white potatoes, whole tomatoes
Citric acid tablets	Citric acid and salt	Canning bean sprouts
MSG tablets	MSG and salt	To intensify flavor of canned foods
Extra fine flake	Salt and tri-calcium phosphate	Flour, cake mixes



Ascorbic Acid Betters

★ Reacts directly with nitrites during the curing process to release nitric oxide without aid of naturally occurring reducing agents, thus giving maximum color development

J. C. BAUERNFEIND,
E. G. SMITH and
G. K. PARMAN
Hoffmann-La Roche, Inc., Nutley, N. J.

Laboratory and plant-scale trials, as well as routine practice, have demonstrated important advantages to packers through use of ascorbic acid in the meat curing process.

With its use–

- **Curing time can be substantially reduced.**
- **A more uniform color will result throughout the product.**
- **Better color and flavor can be maintained during storage, distribution, and display.**

There is no complication of the manufacturing process. Weighed quantities of ascorbic acid or sodium ascorbate may be used, or spice or binder mixtures containing one of those products may be employed in appropriate products. For many packers, such mixtures will have definite advantages, such as convenience and greater freedom from technical considerations.

However, three general precautions must be observed:–

1. Curing salts should be added to the mixture or chop as soon as possible.

2. Ascorbic acid in dry or liquid form, or as part of the spice mixture, should be put in the chop or emulsion as late as possible if maximum results are to be obtained.

3. Curing salts and ascorbic acid should not be dissolved together and then added to the chop. For this procedure would expend part of the full value of both products. Sodium ascorbate and curing salts may be dissolved together, if the resulting solution is promptly utilized.

Technical Considerations

Meat and meat products originally were cured with saltpeter or nitrate. But recognizing that the latter was merely a source of nitrite, the Bureau of Animal Industry now permits use of nitrite directly.[1] In practice, however, a combination of nitrate and nitrite is employed to modify the natural pigments of meat and to obtain a red color not significantly altered by heat[2].

In the usual curing process, release of nitric oxide gas from sodium or potassium nitrite to form nitric oxide myoglobin is dependent on naturally occurring reducing substances in the meat, the acidity of the meat, as well as the temperature, and the time.

Such factors are variable even in meats of the same variety, so that extended times and high temperatures are considered necessary to get uniform cure. These operating problems are difficult to control and are conducive to use of an excess of curing salts.

Ascorbic acid reacts directly with sodium or potassium nitrite to give a positive release of nitric oxide independent of any naturally occurring reducing substances in the meat. The reaction takes place slowly at low temperatures, but in the heat of the smokehouse, it is quite rapid. These pertinent reactions, believed to take place under ideal conditions, are shown below:

1. $2Na \text{ or } 2KNO_2 \longrightarrow 2HONO$
   Nitrates at the pH of meat (5.2-6.4) form nitrous acid.
2. $2HONO + C_6H_8O_6 \longrightarrow 2NO + 2HOH + C_6H_6O_6$
   Nitrous acid plus ascorbic acid produces nitric oxide, water and dehydroascorbic acid.
3. $NO + Mb \longrightarrow$ protected NOMb
   Nitric oxide plus myoglobin forms nitric oxide myoglobin.
4. NOMb $\longrightarrow$ protected NOMb
   Nitric oxide myoglobin in presence of excess ascorbic acid is more resistant to oxidation. Ascorbic acid also reduces met-myoglobin.[3, 4, 5]

Throughout the curing process, it is desirable to obtain an anaerobic, or oxygen-free, environment to insure good color. For if oxygen is present it can react with nitric oxide myoglobin, gradually producing the gray-brown discoloration of met-myoglobin. Oxygen also is capable of oxidizing the nitric oxide in the curing, thus decreasing efficiency of the process.[2]

In such an environment 1 mole of ascorbic acid theoretically reacts with 2 moles of nitrous acid or sodium nitrite to form nitric oxide and dehydroascorbic acid.[6, 7]

What It Is, and Governmental Regulations

The pure ascorbic acid product (vitamin C) occurs as white, odorless crystals or powder, melting at about 374 deg. F. It has a slight acid taste and is freely soluble in water. In containers it is stable to air at room temperature for several years. During prolonged storage, however, the product may take on a buff color without undergoing appreciable decomposition. It is used extensively as an antioxidant in foods.[20]

Sodium ascorbate, the salt of ascorbic acid, is soluable in water. It does not have an acid taste. A kg. represents 888g. of ascorbic acid, hence about 11% more must be used to get the same results as with the acid.

In the U. S., ascorbic acid (¾ oz.) or sodium ascorbate (⅞ oz.) may be used in preparation of cooked, cured, comminuted meat food products for each 100 lb. of fresh meat or meat by-products. Label statement must be made. (BAI Meat Inspection Memorandum No. 194.)

In Canada, both products are permitted in preparation of preserved meats. No label declaration is required. (National Health & Welfare Order, Trade Information Letter No. 97.)

Color, Flavor of Meats

★Protects product quality during storage, distribution and display

★Also used in frozen fruits, frozen fish, milk, juices, beverages, sauerkraut, other foods

According to BAI ruling, a maximum level of 9.10 g. of nitrites from all sources are permitted per 100 lb. of product. Reacting this with the maximum legal amount of ascorbic acid, 21.26 g. (¾ oz.), a theoretical excess of 9.66 g. of the latter is obtained. Such an excess does not exist in practice since some is destroyed by heat and air during the curing and smoking process.

Hollenbeck and Monahan have demonstrated that if the legal quantities of nitrites and ascorbic acid are permitted to react in the presence of unlimited air, there is insufficient ascorbic acid to to release all the nitric oxide gas.[8]

A slight excess of ascorbic acid is desirable at the end of curing since it helps to stabilize the bright red color of nitric oxide myoglobin.[8] It also appears to improve retention of flavor during storage. Assays of wieners treated with ¾ oz. of ascorbic acid per 100 lb. of meat, have demonstrated 0 to 3.0 g. present per 100 lb. of product after processing.

Plant Trials

To date, a number of packers are using ascorbic acid or sodium ascorbate in cooked, cured comminuted products, others are conducting plant trial work. A few of these experiences will be discussed:

Wieners in one trial were commercially prepared using plant fomulas, ingredients, and equipment, then stored up to 10 days at 40 deg. F. All beef trimmings (45%), about ¾ fat and ¼ lean, and lean beef (55%) were used. Ascorbic acid was added at the rate of ¾ oz. per 100 lb. of meat. Data are given in Table I.

In another test, wieners were prepared using standard procedures and above formula with and without added ascorbic acid at the rate of ¾ oz. per 100 lb. of meat. Storage was at 40 deg. F. under light and in darkness, and at 0 deg. (see Table II).

These trials revealed that wieners with the ascorbic acid cure possessed a better color, maintained a color preference, and at times won a flavor preference. Also, that improved color resulted regardless of whether the chop was stuffed immediately and smoked or held overnight at 45 deg. F. and then stuffed and smoked. Rancidity, which usually develops in frozen wieners, was delayed by the ascorbic acid treatment and, although the treated product gradually deteriorated, it was superior to the control at comparable storage periods.

Brockmann and Morse reported on wieners experimentally treated with ascorbic acid and prepared from ground lean beef (30%) and ground pork trimmings (70%).[9] Three schedules were examined, smoking 1 hr. at 170-175 deg. F., ½ hr. at 170-175 deg. F., and no smoking. In all cases products were heated in a steam chest to an internal temperature of 154 deg. F. and shower-cooled. Control samples (untreated) presented an inferior internal color. Those treated with approximately ¾ oz. of ascorbic per 100 lb. of meat never failed to provide full color improvement for smoking periods of ½ hr. or more. With half of the above amount, irregular results were obtained with the ½ hr. smoking period but complete color development was obtained with the 1 hr. smoking.

Anderson found, with wieners, a variable improvement of external color immediately after processing.[10] This product was, however, more uniformly and more completely nitrited by added ascorbic acid. External color and sliced color during holding tests were significantly improved by the ascorbic acid treatment. When seeking reduced smoking or curing time (which can be cut by 30% in some cases), he warns packers to give proper attention to meat set, pasteurization, skin peel, and moisture content of the final product.

Bologna and loaves have been found to be rapidly cured by added ascorbic acid. While no improvement in external color was noted immediately after processing, both external color and sliced color were substantially improved during holding tests[10] (see Table III).

Urbain has emphasized the need for excluding oxygen from cured meat as an aid to color retention,[2] hence the development of vacuum prepackaged cured sliced meats.[11, 12] But, it is quite difficult to consistently maintain a high vacuum pack because of sealing problems, diffusion of oxygen through the film, and purity of gases used.

Frequently, residual oxygen in the package causes fairly rapid fading of the cut surface when exposed to light.

TABLE I—ASCORBIC ACID Improves Wieners Stored at 40 Deg. F.

Storage Time	State	Property Observed	Regular Cure (Control)*	Ascorbic Acid Cure**	Ascorbic Acid Cure***
Initial	Raw	Color	Light br.	Bright red-br.	Bright red-br.
	Cooked	Color	Good	Very good (best)	Very good
	Cooked	Flavor	Good	Very good (best)	Very good
5 days	Raw	Color	Light br.	Bright red-br.	Bright red-br.
	Cooked	Color	Fair	Very good (best)	Very good
	Cooked	Flavor	Fair	Very good	Good
10 days	Raw	Color	Light br.	Dull red-br.	Dull red-br.
	Cooked	Color	Fair	Very good	Good
	Cooked	Flavor	Poor	Good (best)	Good

* Chop stored overnight at 45 deg. F., stuffed and smoked 2 hr. to reach 170 deg.
** Chop stored overnight at 45 deg. F., stuffed and smoked 1¼ hr. to reach 170 deg.
*** Stuffed and smoked at once, 1¼ hr. to reach 170 deg.

TABLE II—REFRIGERATED and Frozen Wieners Were Improved by Adding Ascorbic Acid to Chop

(Initial observations: Regular cure—deep brown color, good flavor; Ascorbic acid cure—bright reddish brown color, excellent flavor.)

Stored at 40 Deg. F.							Frozen, 0 Deg. F. Pound Packages in Film			
Under Light* (Color Observations)			In Darkness (Color, Raw Product; Flavor, Cooked)				(Color, Raw Product; Flavor, Cooked)			
Time Hr.	Regular Cure (Control)	Ascorbic Acid Cure	Time Days	State	Regular Cure (Control)	Ascorbic Acid Cure	Time Months	State	Regular Cure (Control)	Ascorbic Acid Cure
8	Unchanged	Unchanged	4	Raw	Brown	Red-brown	½	Raw	Brown	Red-brown
24	Lt. brown	Lt. red br.	4	Cooked	Good	Very good	½	Cooked	Very good	Excellent
30	Lt. brown	Lt. red br.	6	Raw	Brown	Red-brown	1	Raw	Brown	Red-brown
54	Very lt. br., excessively bleached	Very light, but still reddish**	6	Cooked	Good	Good	1	Cooked	Good	Very good
			10	Raw	Lt. brown	Red-brown	2½	Raw	Lt. brown	Red-brown
			10	Cooked	Old flavor, poor	Good	2½	Cooked	Fair	Very good
							4	Raw	Lt. brown	Lt. red-brown
							4	Cooked	Poor	Good
							5	Raw	Pale	Dull red-br.
							5	Cooked	Rancid	Fair

* Fluorescent lighting, 12 foot candles.
** Color improved after 24 hr. in dark at 40 deg. Control showed no change.

TABLE III—EXPERIENCE of One Packer With Ascorbic Acid or Sodium Ascorbate-Treated Cured Meat Products

Time	Property Observed	Type of Improvement			
		Remarkable	Substantial	Variable	None
Immediately after processing	External color	Regular cured backs	Smoked regular backs Smoked regular bacon	Wieners	Pumped bacon Bologna Loaves (emulsion type) Smoked hams (boneless) Smoked butts (boneless) Boiled hams
During holding tests	External color	Wieners Bologna Loaves	Regular backs	Regular bacon Pumped bacon	Smoked hams Smoked butts Boiled hams
Immediately after processing	Sliced color	None	None	None	.....
During holding tests	Sliced color	Pumped bacon Regular bacon Wieners Loaves	Regular backs Bologna Smoked hams Smoked butts	Boiled hams	.....

* Anderson, D. H., *Canadian Food Industries*, Apr. 24, 1954.

Added ascorbic acid on the cut surface,[20] or film contacting the product, effectively counteracts the fading.

While adding ascorbic acid to cured whole meats has not yet been approved by BAI, there have been some pertinent studies. Wruk and Weckel searched for a method of improving color of skin and flesh or bulk-packaged, vinegar-pickled pig's feet, and they observed that added ascorbic acid in the cure helped create a better color that was markedly retained by also adding ascorbic acid to the vinegar covering solution.[13]

One commercial supplier has announced a new dry agent for curing fancy bacon in a three-day period with conventional hand rubbing and loose stacking in the cellar. The product, available with added ascorbic acid, is reported to give a better color that is retained longer.[14] Sodium ascorbate may enjoy some preference over ascorbic acid for these cures.

Canadian experience has been satisfactory with ascorbic acid in cured whole meats. In trials reported, sodium ascorbate was used in the applied dry mixes or pump solutions.[10] Artery pumping was practiced on hams, stitch or spray pumping on butts. No acceleration in curing was noted, nor was the penetration rate of the cure increased. Improvement was observed, however, in the sliced color of bacon, ham, and butts during holding tests, (Table III).

These products require further study and trials to develop the best application methods. Here, one is confronted with the simultaneous incorporation of curing salts and sodium ascorbate.

Some suggestions for the treatment, in order of increasing complexity, are:

1. Prepare pickle with curing salts, sugar, salt, etc. Add sufficient sodium ascorbate to provide ¾ oz. per 100 lb. of meat as shortly as possible before injection. Keep pickle cool and do not carry over solution for next day's use. Deaeration of brine or water for pickle, thus lowering oxygen content, will extend its use. This procedure is simple to set up for short runs, but does not lend itself to continuous operation.

2. Insert a T or Y tube before outlet valve of pickle pump so two liquid lines—pickle and sodium ascorbate solution—are directed through single needle for artery or stitch pumping. Pressure or volume controls must be included to insure adequate quantities of both solutions to each piece of meat. This modification brings solutions into contact immediately before injection and thus provides for maximum action inside meat. It would not increase present labor cost of meat handling.

3. Introduce pickle by usual artery pump technique, and follow with stitch pumping of sodium ascorbate solution. This procedure, however, requires a second handling of hams, thus increases labor costs.

Other Improvers

At least three types of phosphate compounds have been described for both dry- and pickle-curing of meats to stabilize color, retain moisture, and enable less critical operating conditions during processing.

Di-sodium phosphate has been declared to retain an increased amount of soluble protein and exhibit a larger yield when the meat product is cooked.[15]

Sodium or potassium meta-phosphate for stabilizing meat color during or after canning is reported to help

(*Turn to page 125*)

DRY SOLUBLES

Versatile Seasoning *Agents*

They distribute your flavors better and boost their performance in your foods--even can be used as vehicles for special ingredients

E. J. HOHHOF

Chemist, D & O Dry Soluble Seasonings Div., Dodge & Olcott, Inc., New York City

Exploration of the complex field of flavoring materials, seeking improved methods of application, has resulted in development of a new sphere in the food industry—preparation of dry soluble seasonings.

Popularity of this relatively recent idea may well have been expected, since these agents offer extensive advantages both in specific and general classifications of prepared foods.

What They Are

A "dry soluble seasoning" may be considered a liquid or semi-liquid flavor component or mixture of such components mulled evenly on a dry base of such charcteristics that it will be soluble, miscible, or easily distributed in the product to be flavored.

Flavor components usually are distilled essential oils, or solvent-extracted oleoresins that are the flavor constituents of natural herbs, seeds, and spices.

Synthetics and isolates, prepared by chemical processes, sometimes are used. The ethical seasoning supplier will label these accordingly and offer them only after determining that his client does not object to these materials.

Many bases or carriers have been used to excellent advantage, and choosing of the proper one requires careful consideration of the product into which the flavor is to be introduced. It may be noted that in every case the carrier contributes materially to the finished product.

A few food products and some of the carriers most applicable are given in our accompanying table. Dozens of others have been used in specific products.

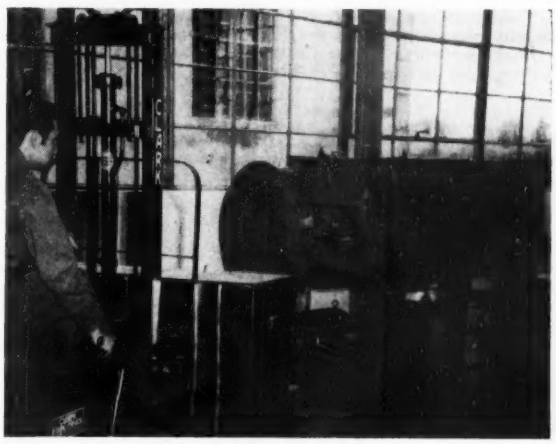
Why They're Used

Some of the benefits of dry solubles, as compared with essential oils or natural spices, are:

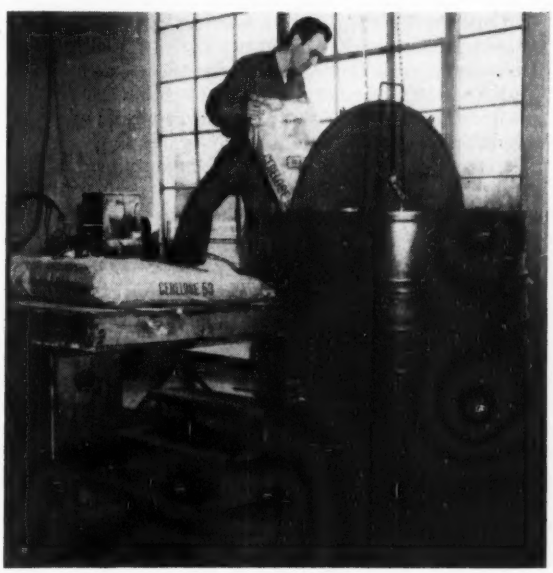
1. *Distribution.* Concentration or strength of flavor can be adjusted so that sufficient bulk material is used to permit an even distribution through a large batch of product. To illustrate, let us consider the impracticability of attempting even distribution of the 30-40g. (approximately 1-1½ oz.) of rather highly insoluble essential oil or oleoresin necessary to flavor 500 lb. of sausage batter during a typical 8-10 min. chop and its maximum of 30 passes through the knives.

If this same 30-40g. of oil is first distributed on 2½ lb. of salt it can easily be spread over a complete revolution

Careful Compounding: From flavors . . .
Oils and oleoresins are weighed, then combined.



. . . and pre-mix . . .
Dry materials are mixed in stainless ribbon mixer.



. . . into blend
Finally, concentrated flavors and drys are blended.

Recommended Bases for Dry Soluble Seasonings

Product	Base
Cured meats	Cane or beet sugar, salt
Sausage, dry	Cane or beet sugar, salt
Sausage, comminuted	Dextrose, salt, dried corn syrup
Loaf items	D.M.S.* salt, lactalbumin, dextrose, flour, gelatin and gums
Bakery items	Flour, edible wheat starch Cane or beet sugar, dextrose
Beverage powders	Cane or beet sugar, dextrose
Prepared desserts	Edible starch, corn or cane sugar, gelatin, cocoa, D.M.S.
Confections	Sugar, cocoa
Vanilla	Edible starch, cane or beet sugar
Dressings and sauces	Cane or beet sugar, dextrose, gums, hydrolyzed proteins, salt
Spreads	Salt, hydrogenated vegetable oils
Animal feeds	Dextrose, dried molasses, bone meal, flour, soy grits, dried corn syrup

* Defatted milk solids.

PRECAUTIONARY MEASURES. Some flavors are unstable on salt. For "all-meat" items, flavor must not be on D.F.M. or flour.

Stabilizers and additives to retard volatilization are necessary in seasoning for dry finished products of long shelf life.

Gums, hydrolyzed proteins, D.M.S., and molasses are very hygroscopic and require special packaging.

of the chopper or premixed with other dry materials going into the product. Obviously, this advantage is not entirely valid in the case of fluid syrups or oils such as beverage syrups or salad dressings.

2. *Availability of Flavor.* One of the chief attributes of distilled or extracted flavors has always been their nearly 100% effectiveness after distribution in product. The same advantage applies to the dry soluble and results from its ready availability to the tongue.

When natural products such as ground pepper are eaten in food it has been stated that only that part of the flavor represented by the oil in the outside of the pepper particle or "enfleured" into the food can be tasted. The oil, alkaloid, etc., still retained within the cells of the pepper has no flavor value and represents wasted money.

In contrast, as the salt or other base of the dry soluble dissolves in a product, the flavor components are entirely available to the tongue and olfactory senses.

3. *Quantity Control.* One reason for popularity of the extended product is that quantities of 1 to 10 lb. of dry soluble—sufficient bulk for easy handling—can be employed.

Another factor of great importance is the relatively constant flavor level of the essential oil or oleoresin and of the dry soluble in which it is used.

These oils and oleoresins may be considered almost entirely flavor, and variations of more than a few percent in level of authentic materials is unusual.

On the other hand, variations of more than 100% in yield of flavor contributing oils may be expected from crop to crop, lot to lot, and grade to grade of natural seeds, leaves, and roots.

4. *Purity.* Essential oils and oleoresins may, for all practical purposes, be considered sterile. Dry solubles therefore are as free from bacteria, molds, other organisms and foreign matter as is the carrier employed. Thus salt and sugar base solubles usually test entirely free of foreign matter and less than 1,000 organisms per gram. Milk powder, flour, starch, gelatin and gum base solubles, which should be free of foreign matter, contain less than 10,000 organisms per gram if materials are properly selected.

In contrast, natural materials as marketed in this country invariably include some foreign material, often as much as 4%. Also, high bacteria and mold counts frequently are encountered. In the case of perishable foods, and even with some sterilized foods where thermophiles are a problem, the processor may wish to consider the dry soluble as a means of reducing the ever-present bacteria and mold problem.

5. *Cost.* A comparison of cost in terms of unit flavor per dollar usually will indicate the most economical process to be that of adding concentrated flavor—that is, the essential oil, oleoresins, or synthetic directly to the product. This is closely followed by the use of dry solubles.

Use of the natural ground spice generally means the processor must pay a premium of 20-50% for a given level of available flavor. Reason for this may be illustrated by the following example: Extensive testing has indicated that approximately 50% of the flavor in ground black pepper is available to the tongue after preparation in a heat-processed, ready-to-eat food.

On the other hand, yield of oleoresin from black pepper will vary from 8-14% but will average fairly close to 10%. Thus, approximately 5 lb. of oleoresin, properly distributed, will provide the same flavor as 100 lb. of average ground pepper.

This leaves a bonus of 5 lb. of oleoresin, complicated only by cost of extracting and of the carrier used. Actually, the cost of carrier may be disregarded, since proper formulation requires it to be a normal part of finished product.

How They're Made

Three general methods of processing are employed in the manufacture of dry solubles: (1) Simple mixing; (2) mulling, and (3) ball mill.

A few formulas, employing relatively large quantities of free flowing oils and a dense carrier such as granulated salt, lend themselves to simple mixing. For this purpose a ribbon mixer most commonly is used, sometimes modified by addition of special agitators that provide a mild abrasive action at the tank wall.

Such a mixer is somewhat more effective when pulpy or fibrous materials are included in the formulation. This method fails when oleoresins and other viscous concentrates are added or when the concentration of oil is low.

Most effective method in common use today is that which employs the modern wheel muller, a modification of the pan muller of the premedieval era. In this equipment plows pass the product under heavy revolving wheels that press it out against a wearplate. Mulling has been very successful. Only on those rare occasions when insufficient purchase by a slippery carrier causes failure of the wheels to turn does the manufacturer find a formulation that does not adapt easily.

Some manufacturers use the ball mill, in principle a large revolving drum into which the flavor concentrate, carrier, and a quantity of heavy porcelain or flint balls are charged. As the drum revolves the tumbling action results in mixing and a mild mulling action. This equipment produces a perfectly acceptable product. But it is somewhat cumbersome, slow operating, and difficult to clean.

Maintaining absolute cleanliness is a major problem with all equipment. A thorough cleaning is necessary after each batch operation since flavoring material clinging to the walls and agitators tends to contaminate the succeeding formulation. Some flavors are extremely intense and persist through many cleanings.

A common cause of lack of stability and the resultant short life of some seasonings is metal contamination. It long has been recognized that the presence of trace amounts of copper, iron, nickel, and other metals, catalyze or hasten oxidation and other undesirable reactions in oils and oleoresins. For mixing equipment, containers, and utensils, stainless steel has been found acceptable.

(*Turn to page 137*)

It Comes in Many Types Each Suited to a Particular Food Product

Types, Grades, and Uses

GRANULATED

Very Fine . . . Dry cake mixes, muffin and pudding preparations, gelatine dessert powders, cold process whips and frappes, pan coating, dusting powder, fine texture baked products.

Extra Fine, Fine . . . Baking, preserving, beverages, ice cream, canning fruits and vegetables, salad dressings, pie fillings, fudge, caramels, jelly and gum work in confectionery, meat curing, cereal products, flavoring extracts, fountain syrups.

Medium Fine . . . Syrups for carbonated beverages, pure white fondants, marshmallow production, hot or cold process.

Medium . . . Highest quality confectionery products. Fondant production where very white, brilliant fondants are needed. Also used for hard candy, whether clear, pulled, grained or filled. High quality liqueurs and cordials. High cooked coconut confections. Also used for decorative purposes on cookies, etc.

Standard . . . Same general uses as above.

Coating . . . Coating confectionery pan goods, dry mixes such as prepared chocolate powders, fruit drink powders, dessert powders and cake mixes.

Bakers' Special . . . Fine textured cake baking, cake mixes, doughnut flours, hard sauces.

Canners'—(conforms to specifications established by NCA Research Lab.) . . . Canning non-acid vegetables such as corn and peas.

Bottlers'—(conforms to specifications of ABCB.)

. . . Syrups with excellent color and clarity.

Sanding . . . Sanding gum drops, cookies, other products where uniform brilliant crystal surface is sought.

POWDERED

Confectioners XXXXXX . . . Cream fillings for biscuits, uncooked icings and frostings, extra smooth fruit and nut pastes, uncooked fondants and cream centers.

Confectioners XXXX . . . Uncooked frostings and icings, for sprinkling pies, buns and other pastries, for dusting lozenges, cut gums and jellies, fruits, marshamallows, chewing gum, chocolate and confectionery manufacture, finishing charge on pan goods.

Standard . . . Dusting mixture where baked goods are prone to "sweat" easily, dry mixes.

Coarse . . . Used in above cases where Standard is too fine.

SOFT

Light Yellow, Medium Yellow, Golden Brown, Dark Brown . . . Lighter grades generally used in bakery products, icings, condiments and candies, where mild flavor is desired. Darker grades in gingerbread, plum puddings, mincemeat, baked beans, other dark colored, highly flavored goods.

LIQUID

Water-White . . . Beverage, confectionery, preserving, dairy, canning and baking industries. For fountain syrups, toppings, glace fruits and fondants, bakery icings and fillings. Frozen fruits, liqueurs and cordials, blended table syrups, mayonnaise and salad dressings, and in pickling and brewing.

Light-Straw . . . Wherever solution of sugar in water is employed, providing proper balance of formula is assured, and also providing that the small amount of color and slightly higher percentage of non-sugar components are not detrimental to product.

LIQUID INVERT

Water-White, Light-Straw (in various degrees of inversion) . . . Preserving, ice cream, beverages, candy and baked goods. Fountain and table syrups, glace and conserved fruits and icings. Water-white only used for packing nuts in syrup, and for liqueurs and cordials.

Sugar Types and Uses

Timely review of its quality enhancing role in foods lists the many forms and their characteristics, shows how it improves frozen-vegetable flavor, 'catalyzes' baking

DAVID QUINLAN
Sugar Information, Inc., New York City

When a housewife buys a product she could make at home, she expects it to contain sugar if she normally uses sugar in its preparation in her own kitchen. If it doesn't, or if something has been used to replace sugar, she's apt to feel let down.

This instinctive preference carries throughout almost every kind of food. For example, marked consumer preference for frozen green peas to which sugar is added during the packing process has been demonstrated in recent tests conducted by two independent research organizations.

Of 752 women in eight cities who sampled the peas, 525 preferred those to which had been added 3% sugar by weight; 204 voted for those packed in their natural state without sugar, and 23 expressed no preference.

One particular comment was characteristic: "They taste like the peas I used to gather from my garden—fresh and sweet."

Sugar is defined as a sweet crystallizable substance, colorless or white when pure, occurring in many plant juices, and forming an important article of food. It is called, specifically, cane sugar, sucrose, and saccharose. Chief sources are sugar cane and sugar beets. The completely refined products of each are identical, and they form the granulated sugar, loaf sugar, etc., of commerce.

By definition, therefore, and by long-established common usage, sugar means sucrose and nothing else. The word "sugars" can refer in the chemical sense to the family of carbohydrates known as the saccharides, any member of which correctly is called "a sugar" but not simply "sugar." The sugars known to commerce, other than sugar itself, properly bear a prefix to identify their source—as milk sugar, corn sugar and malt sugar.

For general overall information, the various grades of sugar products can, for convenience, be divided into the following relative categories:

Large grain crystalline. Comprising such grades as Standard, Medium, Medium Fine Granulated, and Sanding, these customarily are used for highest quality products in certain special manufacturing processes—i.e., fondants and clear hard candies.

Fine grain crystalline. Represented by Fine and Extra Fine Granulated and special grades such as Canners' and Bottlers' Granulated.

Extra Fine and Fine are the two important granulated sugar grades for "all purpose" general food manufacture.

Very fine grain crystalline is a class including such grades as Very Fine Granulated (often called fruit granulated), Coating, and Bakers' Special.

They have the property of being very rapidly dissolved and, therefore, are most useful in all types of dry mixes and cake baking where fine texture is desired.

Powdered. Such grades as Coarse and Standard Powdered, Confectioners XXXXXX and XXXX are used where their properties and grain sizes are desired per se and not where the product is put into solution.

Brown or soft sugars vary in color from light yellow to dark brown and are used primarily in special recipes and food products for their cane-molasses flavor.

Syrups or liquid sugars can be employed in almost all cases wherein a solution of sugar in water is needed, provided amount of water contained is not a limiting factor in processing nor a detriment to the final product. Syrups are offered in colors from water-white to dark brown.

Liquid invert syrups have physical properties distinctly differing from those of regular liquid sugars. They possess the desirable properties of being hygroscopic (moisture-attracting and holding) and of retarding crystallization of concentrated sugar solutions. They are used, with judgment, wherever a sweet, moisture-retaining ingredient is necessary to maintain freshness and increase shelf-like of foodstuffs and aid in the standardization of processes.

Improves Bread Quality

In baking, sugar performs six major functions: (1) It supplies food for yeast during fermentation; (2) increases fermentation tolerance; (3) develops appetizing crust color; (4) provides sweetness and flavor; (5) contributes to initial softness, and (6) controls baking time and yield.*

Types of sugars ordinarily employed in baking can be grouped by products as follows:

Bread: Fine, Extra Fine Granulated, Soft Sugars (for dark breads) and water-white liquid sugar.

Cakes: Bakers' Special (for exceptionally fine texture), Very Fine Granulated, Fine Granulated, Extra Fine Granulated and Soft Sugars (for dark, highly-flavored cakes), also various grades of liquid and liquid invert sugar with only a small percentage of invert sugar.

Cookies: Bakers' Special, Very Fine Granulated, Fine and Extra Fine Granulated, liquid sugars, and low percent liquid invert.

Doughnuts: Bakers' Special, Very Fine, Extra Fine, and Fine Granulated.

Dusting Powders: Confectioners XXXXXX and XXXX, Standard Powdered, and Coarse Powdered.

Pie Fillings: Very Fine, Extra Fine, and Fine Granulated, liquid sugars, and liquid invert sugar (medium invert content).

Dry Mixes: Bakers' Special, Very Fine Granulated, and Coating.

Meringues: Bakers' Special, Very Fine, and Extra Fine Granulated.

Icings: Fondant, boiled or cooked types: Medium Granulated (for higher quality), Fine and Extra Fine Granulated and liquid sugars. Uncooked types: Confectioners XXXXXX and XXXX.

Types o of sugar used in other food-processes are:

Carbonated Beverages: Use Medium Granulated (for exceptional clarity and brilliant syrup), Bottlers' Special, Fine Granulated, Extra Fine Granulated, liquid sugars, and liquid invert.

Hard Candies: Standard, Medium and Medium Fine Granulated (for exceptional quality), Fine and Extra Fine Granulated, and liquid sugars.

Fondants, cooked: Standard and Medium and Medium Fine Granulated (for highest quality), Fine Granulated, Extra Fine Granulated, and liquid sugar. Uncooked: Confectioners XXXXXX.

Caramel, Nougat, Fudge: Fine Granulated, Extra Fine Granulated, liquid sugars.

Sugar Wafer Fill: Confectioners XXXXXX and XXXX.

Marshmallows: Fine Granulated, Extra Fine Granulated, and liquid sugar.

Gums and Jellies: Fine and Extra Fine Granulated, liquid sugar.

Dry Coatings: Confectioners XXXXXX and XXXX (no starch), Standard Powdered, Coating, and Extra Fine Granulated.

Syrups: Medium Granulated (highest quality), Fine Granulated, Extra Fine Granulated, and liquid sugar.

Crystallizing Syrups: Medium and Standard Granulated, water-white liquid sugar.

Sanding Gum Pieces: Sanding, Standard and Medium Granulated (mainly for Easter panorama eggs, depending upon crystal size desired).

Chewing Gum: Confectioners XXXXXX (no starch).

Chocolate Covered Cream Centers: Confectioners XXXXXX and XXXX (no starch), Coating.

Other Products

Preserves and Jellies: Standard, Medium, Fine Granulated, Extra Fine Granulated, liquid sugars, and liquid invert.

Canning: Fine Granulated, Extra Fine Granulated, Canners (specially prepared for canning and recommended for non-acid vegetables such as peas, corn), liquid sugar, and liquid invert.

Ice Cream: Fine Granulated, Extra Fine Granulated, and liquid sugars.

Sweetened Condensed Milk: Medium Granulated, Fine Granulated, Extra Fine Granulated, liquid sugar.

Chocolate Milk: Fine Granulated, Extra Fine Granulated, and liquid sugars.

Fountain Syrups: Fine and Extra Fine Granulated, Medium Granulated (for nutmeats packed in syrup), liquid sugars, and liquid invert.

Table Syrups: Fine Granulated, Extra Fine Granulated, liquid sugars, and liquid invert.

Glace and Candied Fruits: Standard Granulated, Medium Granulated (for highest quality), Fine Granulated, Extra Fine Granulated, and liquid sugar.

Dry Mixes: Cake, muffin, gelatine dessert, chocolate drink, pudding, dessert, etc.: Coating, Extra Fine Granulated.

Frozen Fruits: Fine Granulated, Extra Fine Granulated, Fruit Granulated, liquid sugar and liquid invert.

Meats (for curing): Fine Granulated, Extra Fine Granulated, and occasionally Soft.

Mayonnaise, Salad Dressing, Condiments: Fruit Granulated, Extra Fine Granulated, liquid sugar and liquid invert.

In addition to the various types and grades, convenience and economy in storing, handling, and usage are also afforded by a variety of packagings.

In granulated sugar, packages range from 1-100-lb. bags. Many refiners also operate bulk trucks.

Sugar also is delivered in covered hopper-type railroad cars, capacity 80,000-100,000 lb., and portable, 2,000-4,000 lb. bins, shipped by truck or rail.

Liquid sugars are put up in 30 and 55 gal. drums. Usually, however, they are shipped in specially-designed tank trucks and tank railroad cars.

Quality that sugar gives to food, comparative costs vs. substitutes, and facts outlined above make it the logical choice for processors.

* Bohn, R. T. *Sugar in Bread Baking.* Sugar Information, Inc., New York City, April, 1954.

A Few of the Many ⟶

Typical products now available. In 1951, there were 53 different varieties, today there are considerably more.

★

Agents make possible appealing variety of palatable products that safely can be enjoyed by persons needing specialized foods . . . How to employ them in canned fruits, jams, jellies, soft drinks, frozen and unfrozen desserts

LOW-CALORIE INGREDIENTS
Big Booster of Dietetic Foods

KARL M. BECK

Chemical Sales Division, Abbott Laboratories, North Chicago, Ill.

It has been estimated that there are 2-5 million diabetics and 25-30 million people in the U.S. for whom overweight is a health problem.

Combined, they form a potential market of 1/6-1/5 of our total population which, for health reasons, calls for low calorie or sugarless foods.

To these people the synthetic sweeteners,* which provide sweetness without adding calories, are making possible a wide variety of palatable foods that they can enjoy with safety. And the total effect of these factors in creating interest in dietetic foods is illustrated by production statistics.

An estimated 10 million cases of canned dietetic foods were packed in 1953, constituting a 100% increase over the 1951 figure.

In 1949 there were 17 packers marketing 33 dietetic food products. In 1951 this had increased to 85 packers of 53 such products, and the figure is considerably greater now.

Dietetic soft drinks are being made by more than 150 bottlers, and the low-calorie beverage market has grown from virtually nothing in 1950 to the sale of between 5 and 10 million cases in 1953.

Sugar Sales Up, Too

With the phenomenal growth of the dietetic food market and the tremendously increased interest in low-calorie products, it is interesting to note that sales of sugar have increased steadily during this same period—being estimated to be up 5-8% in 1953 compared with 1952.

This strongly indicates that foods and beverages sweetened with synthetic products are appealing to a new market. This new, heretofore unserved or poorly served market, is composed of people who bought sparingly of many sugar sweetened products, but who are eager to have pleasant tasting foods sweetened with non-caloric agents.

Since synthetic sweetening agents are non-nutritive they do not compete with sugar, a wholesome food and the most concentrated source of carbohydrate calories known.

Used in Many Foods

Sucaryl is widely used in canned fruits and fruit juices, jellies and jams, and carbonated beverages. It is finding increasing use in frozen desserts, geltin desserts, puddings, frozen fruits, salad dressings, condiments, cookies, and flavoring extracts. Its employment in a wide variety of other products has been proposed, and many such additional applications are being investigated.

Sucaryl is stable to boiling, baking, freezing, and other food processing conditions from pH 2 to 10, and it exhibits no aftertaste in normal useful concentrations. Because of the great interest in low sodium foods by many of the people on restricted calorie diets, the calcium salt form has been especially popular with manufacturers of dietetic foods.

Although Sucaryl and saccharin are quite different from each other from the standpoint of chemical structure, several of their properties as sweetening agents are similar. Both are many times sweeter than sugar—saccharin is

* Saccharin and Sucaryl ® are only substances approved by FDA for food uses. Latter is registered trademark for cyclamate Abbott. It is prepared in two forms—sodium and calcium cyclamate. Also see Reference 1 at end of this article.

TABLE I—FORMULA for Sugar-Free Bottling Syrup*

Ingredient	*Amount*
Water, 190-210 deg. F.	20 gal.
Pectin, N.F., Exchange #444	6 lb.
Sodium benzoate	12 oz.
Sucaryl calcium	9 lb.
Water, cold	60 gal.
Flavor	3 gal.
Citric acid, 50% solution	1¼ gal.
Water, to yield	96 gal.

Throw 1 oz. of syrup to a 7 oz. bottle of beverage.

*Gallagher, L. D., and Poulsen, S. D., *Sunkist Growers reference sheet No. 435.*

TABLE II—FORMULAS for Sugar-Free Jams

Apricot Jam*

Ingredients	*Amount*
Pitted fresh apricots, crushed	25 lb.
Water	20 lb.
Glycerol, U.S.P.	3 lb.
Low methoxyl pectin (Exchange #466)	6 oz.
Citric acid, U.S.P.	2⅔ oz.
Sucaryl sodium	2¾ oz.

Pour glycerol into kettle and stir in pectin to smooth slurry. Add water and stir until no lumps remain. Heat and add fruit. Stir and boil for about 5 min. Add citric acid and Sucaryl. Boil about 5 min. more. Pour into containers while hot and seal immediately.

Grape Jam*

Ingredients	*Amount*
Stemmed seedless grapes	28 lb.
Water	14 lb.
Sorbitol (as a 70% syrup)	7 lb.
Low methoxyl pectin (Exchange #466)	8 oz.
Citric acid, U.S.P.	1½ oz.
Sucaryl sodium	½ oz.
Calcium chloride, 2.2% solution	22 fl. oz.
Certified color if desired	

Mix pectin well with 2 lb. of sorbitol and dissolve in warm water. Add citric acid, Sucaryl, and remaining sorbitol. Bring to boil and add fruit. Cook for 10 min., then add calcium chloride slowly and with good agitation. Pour into containers and seal.

**Sunkist Growers reference sheets Nos. 379 and 379-A.*

TABLE III—SPECIAL RECIPE for Dietetic Jelly With Near Minimal Caloric and Carbohydrate Values*

Ingredient	*Amount*
Fruit juice (natural strength)	80 lb.
Water	10 lb.
Low methoxyl pectin (Exchange #466)	1 lb.
Cyclamate calcium, Abbott (Sucaryl®)	8 oz.
Yield	approx. 100 lb.

If concentrated juice (50 deg. Brix or higher) is available, preparation of batch is simplified. Pectin is poured into 4-5 lb. concentrate slowly with good mechanical agitation, then paste is added to single-strength juice.

If concentrate is not used, pectin slowly is sifted into juice-water mixture with vigorous agitation.

In either event, heat pectin-juice-water mixture to near boiling and slowly add Sucaryl solution (also heated) with good agitation. Batch then is ready to fill.

*Gallagher, L. C., Sunkist Growers, personal communications.

TABLE IV—FROZEN DESSERT MIXES With Reduced Calories

Ingredients	*Quantity (Percent)*[1]			
Butterfat	4	6	12	12
Milk solids, not-fat	12	10.5	11	8
Glucose	5	—	4	—
Sorbitol (or sorbitol-mannitol mixture)	—	16	—	16
Glycerine	3	—	3	—
Gelatin or sodium alginate	0.25	—	0.22	—
Edible protein[2]	5	—	4	—
Stabilizer[3]	—	3	—	4
Emulsifier[4]	0.16	0.1	0.16	—
Sucaryl calcium	0.27	0.22	0.27	0.23
Total Solids	29.6	33.3	35.1	38.3
Overrun	85	80	85	85
Calories per 100g.	134	144	196	193

[1] First and 3rd formulas, Tracy, P. H., New Dairy Products Conference, Dept. Food Tech., U. of Ill., April 20, 1954. Second and 4th formulas, Crest Foods Co., Ashton, Ill. *technical bul., B-33.*

[2] Hydrolyzed protein made by U-Cop-Co, Division of Wilson & Co., Inc., Chicago.

[3] Stabilizer, Crest Diabetic Base, Crest Foods Co., Ashton, Ill.

[4] Amount of emulsifier depends on type used. Figures indicate monodi-glycerides. Synthetic emulsifiers are more efficient.

claimed to be 300 to 500 times and Sucaryl to be at least 30 times as sweet as sucrose. Exact sweetness of both depends on concentration and on the substance being sweetened.

Since relatively small amounts of either produce sweetening effects equal to sugar, problems of bulk loss may result when substituting them.

Neither is carbohydrate-like in structure, so there is no depressing of the freezing point of water that would prevent ice crystallization in frozen desserts, or increase its viscosity to a syrupy consistency.

Despite these differences, it is possible in many products simply to replace sugar with an appropriate amount of a non-nutritive sweetening agent in order to prepare an acceptable dietetic product. Where problems of bulk, body, texture, etc., require either use of adjuncts or extensive formula changes, they have been solved in a variety of ways, depending on the individual food products and on particular requirements of the different manufacturers.

Dietetic Beverages

In the soft drink field, some bottlers have found that little formula change is necessary other than replacement of sugar with an artificial sweetener. Others believe that the beverage is too watery and lacks proper "mouth-feel" unless a bodying agent is used. For this bodying effect, pectin is the agent most frequently used, in about 0.1%.

Body also can be obtained with sorbitol or any of the various synthetic or natural hydrophilic colloids, such as sodium carboxymethylcellulose, methylcellulose, alginates, gums, seaweed extractives, etc.

Some bottlers have found it desirable to increase the flavor level slightly in dietetic beverages. Foaming has been encountered, too, but it is reported that the use of sodium citrate helps control it. A sample bottling syrup formula is given in Table I.

Sugarless bottling syrups are being marketed by some of the flavor and extract manufacturers. Artificially sweetened flavoring extracts for other purposes also are being produced. Low-calorie syrup substitutes, such as a maple flavored one for table use, are

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- **Cake Icing Mixes**
- **Pudding Powders**
- **Gelatin Desserts**
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Alva FLAVORS

* The SEALVA process is a method whereby minute droplets of flavor oils are sealed against the ravages of atmosphere and shelf-life within an impermeable membrane of edible gum. The flavor contained in this dry powdered form is released instantly in the mouth or in liquids.

becoming available. As with the carbonated beverages, these products may or may not use a bodying agent for viscosity.

Canned Foods

For years the people who could not eat sugar-sweetened canned fruit had to rely chiefly on non-sweetened, water-packed fruit as an alternative. Sucaryl has proven to be an excellent sweetening agent for these products. Commercial packs contain 0.07-0.44% of this sweetener, depending upon the fruit and the sweetness level desired. Viscosity can be obtained by the addition of 0.5-1% bodying agent, but most canners have not found their use necessary. Also there is always the danger of dietetic products being purchased by mistake if they resemble the standard products too closely.

It is interesting to note that the Council on Foods & Nutrition of the American Medical Assn. has granted its seal of approval to some of the dietetic canned fruits sweetened with Sucaryl, but not to any containing a thickening agent also.

Jams, Jellies, Desserts

Good dietetic jams and jellies can be prepared using low methoxyl pectin (with sorbitol or glycerine added to furnish texture) and synthetic sweetening agents. For some typical jam formulas, see Table II. These illustrate the use of either sorbitol or glycerine as bodying adjuncts, and the necessity for calcium ions to get firm gelling of the pectin, with the amount of calcium required dependent upon the particular fruit used.

A jelly formula has been developed at Purdue University which also uses pectin, glycerine, and Sucaryl.[2] It is reported to have excellent flavor and consistency with less than half the calories of sugar sweetened jelly. A special dietetic formula (see Table III) devised by Sunkist Growers, is believed to offer a minimal number of calories for this type of product.

The jelly lacks the body and gloss of dietetic products containing sorbitol or glycerine. However, these polyhydroxy compounds are metabolized like carbohydrate and furnish the same number of calories per unit weight as sugar. Elimination of them permits a product with lower caloric value.

Several dietetic gelatin dessert powders now are on the market. These generally consist of a mixture of gelatin, citric or other edible acids, Sucaryl or saccharin, a citrate or phosphate buffer, flavor and color. If liquid flavors are used, sorbitol may be added as a dispersing agent, but the use of dry flavors and colors makes such agents unnecessary. The Sucaryl salts are without buffering effect themselves. So the buffering requirements of the dietetic products may be different from those of sugar containing ones.

Several ice cream manufacturers now are making dietetic or diabetic frozen desserts in relatively small quantities. However, there is quite an active interest in this type of product despite the many problems involved. In general, the products have 12% or more butterfat and can be called ice creams.

Polyhydroxy compounds – sorbitol, mannitol, and glycerine–are used to help supply bulk and to control the freezing point of water so that ice crystals won't develop on storage. A stabilizer is added to furnish texture and adequate overrun, and an emulsifier helps provide smoothness.

A truly sugar-free ice cream is impossible because of the lactose content of milk. Furthermore, many manufacturers add small amounts of glucose or sucrose and, as mentioned previously, the polyhydroxy compounds are metabolized as carbohydrates. Amount of synthetic sweetening agent used depends on the other ingredients in the mix.

Since fat provides 2¼ times as many calories as sugar, a more nearly dietetic frozen dessert can be made by using a low-fat formula. In the dietetic products, non-fat milk solids are increased to add bulk. Special stabilizers developed for this field permit mixes containing 30% or less total solids to be frozen to quite acceptable ice cream-like products.

Frozen Desserts, Baked Goods

Some of the dietetic and diabetic dessert formulas developed by Dr. P. H. Tracy and his staff at the University of Illinois, and recently described at a New Dairy Products Conference, are outlined, along with some commercial mix formulas, in Table IV. These illustrate the general composition of such products, although a wide variety of specific formulations is possible.

In baked goods, as with ice cream, sugar serves many purposes besides sweetening. In cookies, for example, sugar provides about one-fourth the total bulk, and is also important in browning and spreading of the batter. Synthetic sweetening agents can replace the sweetness, and suitable bulking agents are being developed for these particular products.

In the bakery field, Sucaryl is used successfully in cookies, bread, and sweet rolls. Non-fat milk solids, defatted flours from grains, soy beans, cottonseed, etc., and proteins from milk ang eggs, have been employed to help supply bulk. Use of Sucaryl to sweeten a coating for breakfast cereals is being investigated.

Artificial sweetening agents currently are being used, or investigated for use, in pickles and relishes, catsup and mustard, salad dressings, toppings and icings for ice cream and other desserts, and a wide variety of other products both in and out of the food field.

The possibility of combining Sucaryl (cyclamate) and saccharin for sweetening food products has been considered, and the combination is described in the patent literature.[3] These patents teach the use of the combination for attainment of relatively high levels of sweetness in many food products, and they suggest that the combination has broad usage, particularly where sweetness equivalent to large amounts of sugar—concentrations above 40%—is required.

Labeling Important

Proper labeling of dietetic food products is an important enough matter to deserve comment in any discussion of these commodities.

FDA requires that the label of artificially sweetened foods and beverages contain statements of the percentage by weight of protein, fat and carbohydrate, and the number of calories provided by a specified portion of the product.

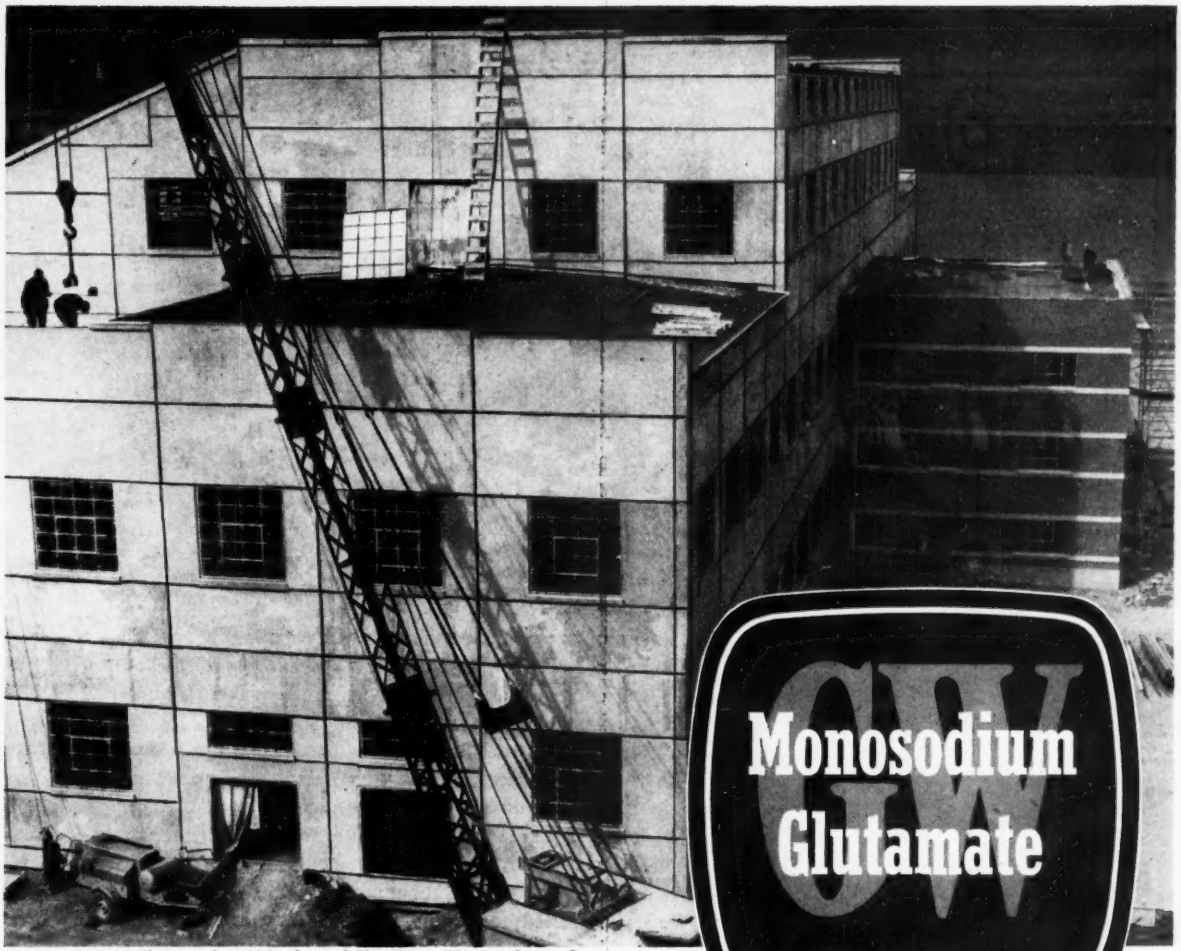
There must also be a statement of the following type in the ingredient line: "Contains —% cyclamate calcium, Abbott (Sucaryl(R)), a nonnutritive, artificial sweetener which should be used only by persons who must restrict their intake of ordinary sweets." Of course, if Sucaryl sodium or saccharin is used, the wording can be changed appropriately.

Furthermore, it is both good advertising and a wise precaution for the label to be different from that of any sugar sweetened products which may be made by the same firm, and for it to clearly indicate that the product is of a "dietary", "special diet", or "dietetic" nature.

State restrictions regulating sale of dietetic products have been a matter of concern, particularly for the beverage manufacturer. Over half of the states now permit sale of artificially sweetened beverages. But the others either prohibit all synthetic sweeteners or specifically ban the use of saccharin.

Factors helping to influence legislatures to change discriminatory rulings are proof of safety of Sucaryl and saccharin. Partcularly cited are reports by FDA's own pharmacology

(Turn to page 126)



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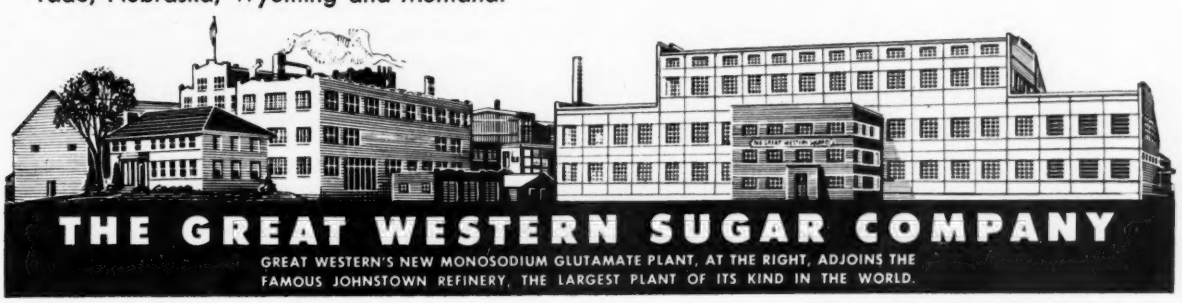

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in a shrimp's eye

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Yet, our scientists keep eyeing those whales. For the whale—and other creatures of the sea—still harbors secrets about vitamin A we'd like to know more about.

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So we keep inquiring about it—even though we've left the shrimp and the whale far behind as economical producers of vitamin A.

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TRUE FRUIT FLAVORS

★ How They're Made

★ What They Can Do

★ Their Limitations

PAUL ADAMS
Givaudan Flavors, Inc., New York City

Production of true fruit flavors is a well-established commercial operation today. It consists of freeing the flavoring principles of a fruit from its extraneous matter by expression, extraction and/or distillation, then further processing to bring them into the best form for commercial use.

Optimum flavor quality and yield would be obtained by processing fresh fruit. The average manufacturer, however, is located in an industrial area far removed from the growing districts. Fresh fruits, if they were shipped, would reach him in spoiled condition. He is, therefore, compelled to use mostly frozen or dried fruits, and juices expressed and preserved at production centers.

Here, fruit is picked at the proper stage of maturity when it furnishes optimum flavor and color strength. Proper sorting eliminates decayed or moldy products, and washing removes dust and spray residues. Then the fruit is ready for expression of the juice or for preservation by freezing.

Latter method is mostly chosen for small soft fruit, such as berries. Not all varieties lend themselves equally well for freezing. Table I gives a survey on the properties of the best known varieties of fruits used by flavor manufacturers.

Extraction of Juice

Apples and grapes contain juice throughout the fruit and may therefore simply be crushed and pressed. Juice is extracted from citrus in such a manner as to avoid expressing the non-desired, bitter substances from the peel. The following three methods may be employed:

1. Peeling fruit and extracting juice in continuous-screw expeller press.

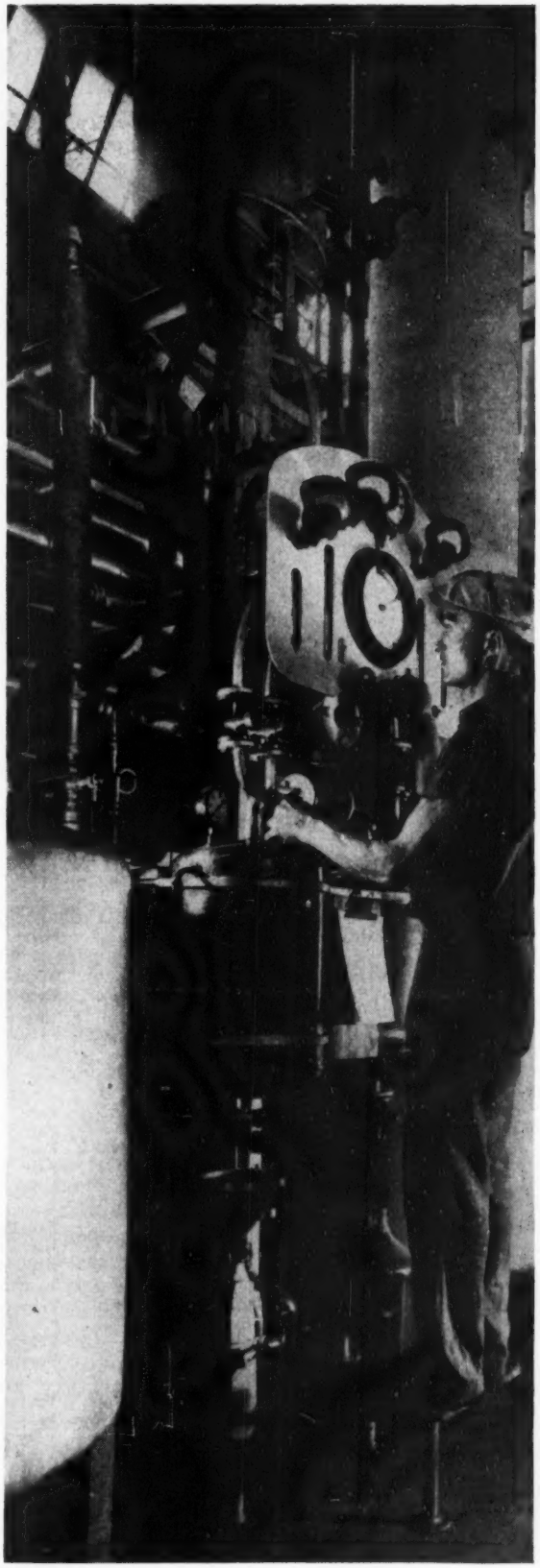
2. Burring of halved fruit with rotating, grooved extractor or burr.

3. Buffing off oil-bearing cells first, then pressing fruit between heavy corrugated rolls.

Methods (2) and (3) are most common today.

Pineapples have a more complicated structure and require a series of operations to remove the fleshy portions that yield the juice.

After extraction, juices are screened to remove seeds and coarse pulp. Then they are deareated—citrus in a surge tank, pineapple by passing over baffles under high vacuum. Those that are popular in a cloudy form do not need filtration or clarification by other means. On the other hand, those for carbonated soft drinks have to be freed



VOLATILE ESSENCES that contribute greatly to true flavors are recovered from alcohol extract of pressed juice and press cake by distillation.

from all extraneous matter to avoid precipitation of sediments in the concentrate and in the beverage.

Clarification may be accomplished by precipitating proteins and carbohydrates with alcohol and by hydrolizing pectins with an enzyme complex (Pectinol). Latter converts part of the pectins into soluble sugars and precipitates them in the form of pectic acid, which also carries down other suspended matter. Starch liquefying enzymes may also be used.

Preservation of Juices

If juices cannot be concentrated into true fruit flavors immediately, they must be preserved. Choice of methods depends on nature of juice and on the purpose for which it is mainly used:

Pasteurization, which destroys spoilage microorganisms by heat, generally is applied to juices such as grape, apple, and pineapple, whose flavor and color withstand a short heating. Yeast is killed at 140-150 deg. F.; mold spores require 175 deg. Heavily carbonated juices safely may be pasteurized at 140 deg. because carbonation inhibits growth of mold. Also, high acidity permits pasteurization at 160-165 deg. F.

Freezing is preferred for heat sensitive juices such as citrus.

Impregnation With CO_2 to about 110 lb. pressure is the most widely used preservation method for apple juice in Europe.

Chemical Preservatives such as sodium benzoate and sulfurous acid (and in Europe also formic acid) were largely used in the past but are now being superseded by pasteurization and freezing.

While sodium benzoate still remains a standard preservative, its use in fruit juices has diminished because it possesses a disagreeable "burning" taste perceptible even if only 1/10% is used. It is more effective against yeast than vinegar bacteria.

More toxic to vinegar bacteria and mold spores is sulfurous acid, which may be added as gaseous or dissolved SO_2 or in the form of SO_2 containing salts such as sodium or potassium metabisulfite and calcium bisulfite.

Necessity of removing the SO_2 before the juices are further processed—which cannot be done without some flavor loss—and the fact that they cannot be packed in tin cans due to the corrosive effect of SO_2, has greatly discouraged its use.

A number of proprietary chemical preservatives also are available, and studies have been made on electrolyses, demineralization, irradiation, addition of antibiotics, etc.

Juices may also be preserved by addition of sugar. Such products are, however, more like fruit syrups and as such are used by consumers rather than by flavor manufacturers.

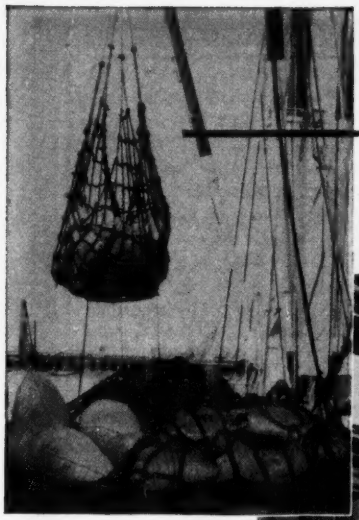
Concentrating the Juices

Nature of the juice, desired degree of concentration, and cost considerations determine which of the following methods should be applied for concentrating flavor.

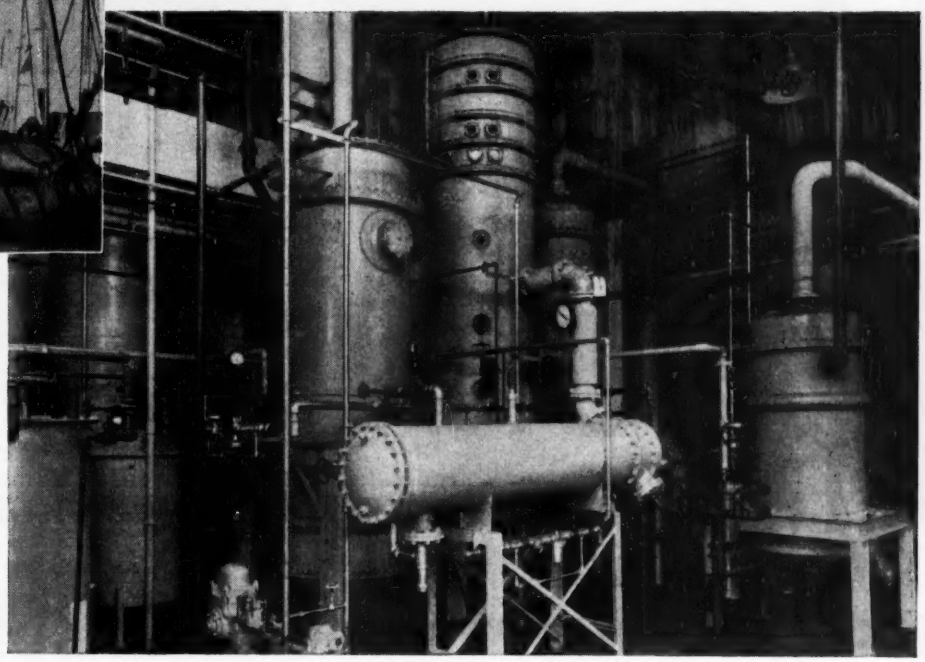
1. **Freezing:** Separating water from flavor principles

TABLE I — PROPERTIES of Various Fruit Varieties Most Commonly Used by Flavor Manufacturers

Fruit	Variety	Principally Grown In	Suitability For Freezing	Flavor	Color	Remarks
Apricots	Blenheim	Calif. & N. W.	Excellent	Good	Good	For manufacture of true fruit flavors dried apricots are also being used.
	Chinese	Utah, Calif. & N. W.	Good	Satisfactory	Satisfactory	
	Tilton	Calif. & N. W.	Excellent	Good	Good	
	Royal	Pacific N. W.	Excellent	Good	Excellent	
Blackberries	Evergreens	Wash., Oregon	Fair	Fair	Fair	Thawing affects color and flavor.
	Himalayan	West	Fair	Fair	Fair	
Cherries, sour	Montmorency	N.Y., Pa., Mich., Wis., Pac. N. W.	Excellent	Good	Excellent	Excellent for true fruit flavors.
	Morello		Excellent	Excellent	Good	
Cherries, sub acid	Royal Duke	N.Y., Pa., Mich., Wis., Pac. N. W.	Excellent	Excellent	Excellent	Are not extensively grown, harvest low, consequently too expensive.
	May Duke		Excellent	Excellent	Excellent	
Cherries, sweet	Royal Anne	Pacific N.W., N.Y., and Calif.	Fair	Changes on freezing storage and thawing	Fair	Freezing and thawing cause flavor loss and changes due to oxidation. Not well suited for flavor manufacture.
	Bings		Fair		Fair	
	Windsor		Fair		Fair	
	Napoleons		Fair		Fair	
	Black Republicans		Fair		Fair	
Cranberries	Early Black	Mass., N. J., Pacific N. W.	Excellent	Excellent	Excellent	Due to high acidity cranberries withstand freezing and thawing very well.
	McFarlin		Excellent	Excellent	Excellent	
	Howes		Excellent	Excellent	Excellent	
Peaches	Elberta	Throughout U. S.	Very good	Good	Satisfactory	Careful handling on thawing required to avoid browning (oxidation).
	Hale	Throughout U. S.	Excellent	Good	Satisfactory	
	Indian	Calif.	Very good	Good	Satisfactory	
	Rio Oso	Calif.	Very good	Good	Satisfactory	
Raspberries black	Morrison	New York and New Jersey	Very good	Very good	Excellent	For manufacture of true fruit flavors small seed varieties are preferable.
	New Logan		Very good	Very good	Excellent	
	Black Pearl		Very good	Very good	Excellent	
	Bristol		Very good	Very good	Excellent	
	Cumberland	Pac. N. W., Tenn.	Very good	Very good	Excellent	
Raspberries red	Cuthbert	N. Y., N. J., Pacific N. W., Calif.	Very good	Very good	Satisfactory	For true fruit flavors small seed varieties are preferable.
	Vicking		Very good	Very good	Satisfactory	
	Washington		Very good	Very good	Satisfactory	
	Newburgh		Very good	Very good	Satisfactory	
Strawberries	Marshall	Pacific N. W.	Very good	Very good	Good	Tend to oxidize rapidly on thawing. Preservation with sugar desirable.
	Klondike	N. C., La.	Good	Good	Satisfactory	



Spice Shipments are not always the same...



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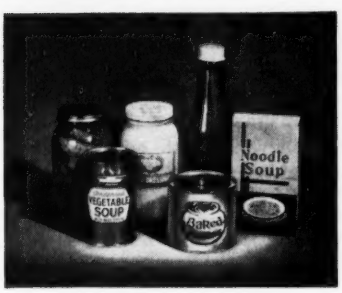

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*Patent Applied For.

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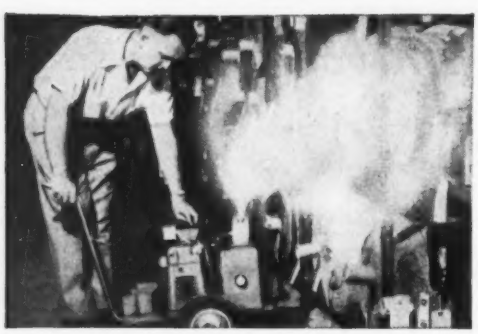

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VAPOSECTOR controls insects by "double penetration." When used with West atomizing equipment, it becomes a "dry fog" that reaches and penetrates hiding places, and then penetrates the insect's outer covering for a permanent kill. Insects have no place to hide, no time to escape. Demonstrations have revealed dead insects in numbers never thought possible.

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Dept. 8

of a juice by freezing yields best quality concentrate. But it allows only low concentrations, also is more expensive than evaporation under vacuum. Therefore, it most commonly is applied to fruits that are sensitive to heat, as for instance citrus and strawberries.

On other juices, a combination of freezing and evaporation may be used, or evaporation under vacuum alone.

2. Vacuum evaporation: A vacuum of at least 28 in. will give a boiling point sufficiently low to prevent caramelization of fruit sugar. But loss of some of more volatile flavor principles cannot be avoided. These volatiles are carriers of aroma and, since perception of flavor is largely an olfactory sensation, its preservation is keystone to a successful manufacture of true fruit flavors.

Methods for capturing and preserving the volatiles were devised as far back as 1917.[1] The Serailian Process, patented in that year, describes an apparatus in which juices are concentrated in a vacuum pan in such a manner that the vapors are fractionally condensed. The fraction containing most of the aroma is returned to the concentrate.

The Pfaudler ester-impregnation method, developed about 10 yr. later, is based on similar principles.[2] Here, ester fractions are captured by condensing the first vapors of one batch in cooled concentrate of preceding batch.

A much more effective and economical method was developed in 1944 by Eastern Regional Research Laboratory of USDA (see *Food Industries*, Feb. '45, p. 164). This method, originally applied to apple and grape juice,[3, 4, 5, 6, 7, 8] meanwhile has been further perfected and made applicable to other fruits. In the process, specially designed apparatus strips the volatile aroma constituents from the juice and condenses them as an "essence", which finally is returned to the cooled concentrate made from the remaining juice.

Another method of recovering the volatile essence is to add alcohol to the pressed juice and/or presscake and distill over the alcoholic essence that contains the more volatile aromatic constituents. This method is in wide commercial use because–

1. It fully exhausts fruit.

2. Addition of ethyl alcohol preserves juice and presscake–imperative if operation cannot be completed immediately after thawing and pressing of fruit.

3. Either heat involved or ester formation caused by presence of ethyl alcohol, or both, tend not only to increase flavor strength, but also to round out flavor more fully.

Not all fruits respond equally well to the various treatments. Hence, it is recommended that they be used interchangeably.

Final Blending

The true fruit flavor concentrates commercially sold are proper blends of concentrated juice, volatile essence, and distillates. They combine all the flavor principles of the original fruit in a highly concentrated and soluble form. They can be made to hold up for a long period by an alcohol content of 14-20%, a sugar content of 40 deg. Bé, or a combination of the two.

While the usual commercial true fruit flavor essentially is a concentrated product, it does not necessarily represent the maximum concentration. Expense of extra high concentration and the danger of flavor impairment by driving the concentration too far make an optimum strength more desirable than a maximum strength.

If more strength is desired without increased cost, true fruit flavors with other natural flavors are the best answer. They consist of true fruit flavors fortified with extractives from other fruits, essential oils, and tinctures of various botanicals.

However, labeling regulations require that at least half of the flavor strength must be derived from the fruit whose name is stated on the label. More fortification from other botanicals or the addition of synthetic fortifiers relegate the product to the classification of an imitation flavor.

TABLE II—TYPES OF FLAVOR Giving Best Results in Various Foods, Beverages and Allied Products

Products	True Fruit Flavor Concentrates and True Fruit With Other Natural Flavors	True Fruit Flavors Combined With Imitation Flavors	Imitation Flavors
Syrups	√	√	....
Soft drinks	√	√	....
Nectar bases	√	....	....
Ice cream	√	....	....
Sherbet, water ices	√	....	....
Gelatin dessert powders	....	√	√
Hard candies	....	....	√
Pudding powders	....	√	√
Summer drink powders	....	√	√
Gum drops, jelly products	....	√	√
Household extracts	....	....	√
Fondants	√	√	....
Cream centers	√	√	....
Baked goods	....	....	√
Cordials, wines, liqueurs	√	....	....
Chewing gum	....	....	√

Advantages of True Fruit Flavors

The more natural taste and aroma that distinguish true fruit from imitation flavors is an advantage that is generally acknowledged and does not need special mention. But this question repeatedly is raised: "Why not use the single-strength juices instead of paying for the concentration, particularly in applications where water is added anyway, as in the bottling field?"

Answer lies in the following advantages that concentrates enjoy over juices:

1. They are standardized in flavor strength, color, and acidity and, consequently, are easier to use. They also reduce danger of precipitations in a finished beverage.

2. Their storage is easy and inexpensive. Juices require more space and, if preserved with alcohol, tie down sizable amounts in alcohol tax. Without such preservation, inventory losses due to spoilage are frequent.

3. True flavors are not necessarily more expensive. When fortified with other natural flavors, they actually are cheaper in use than juices.

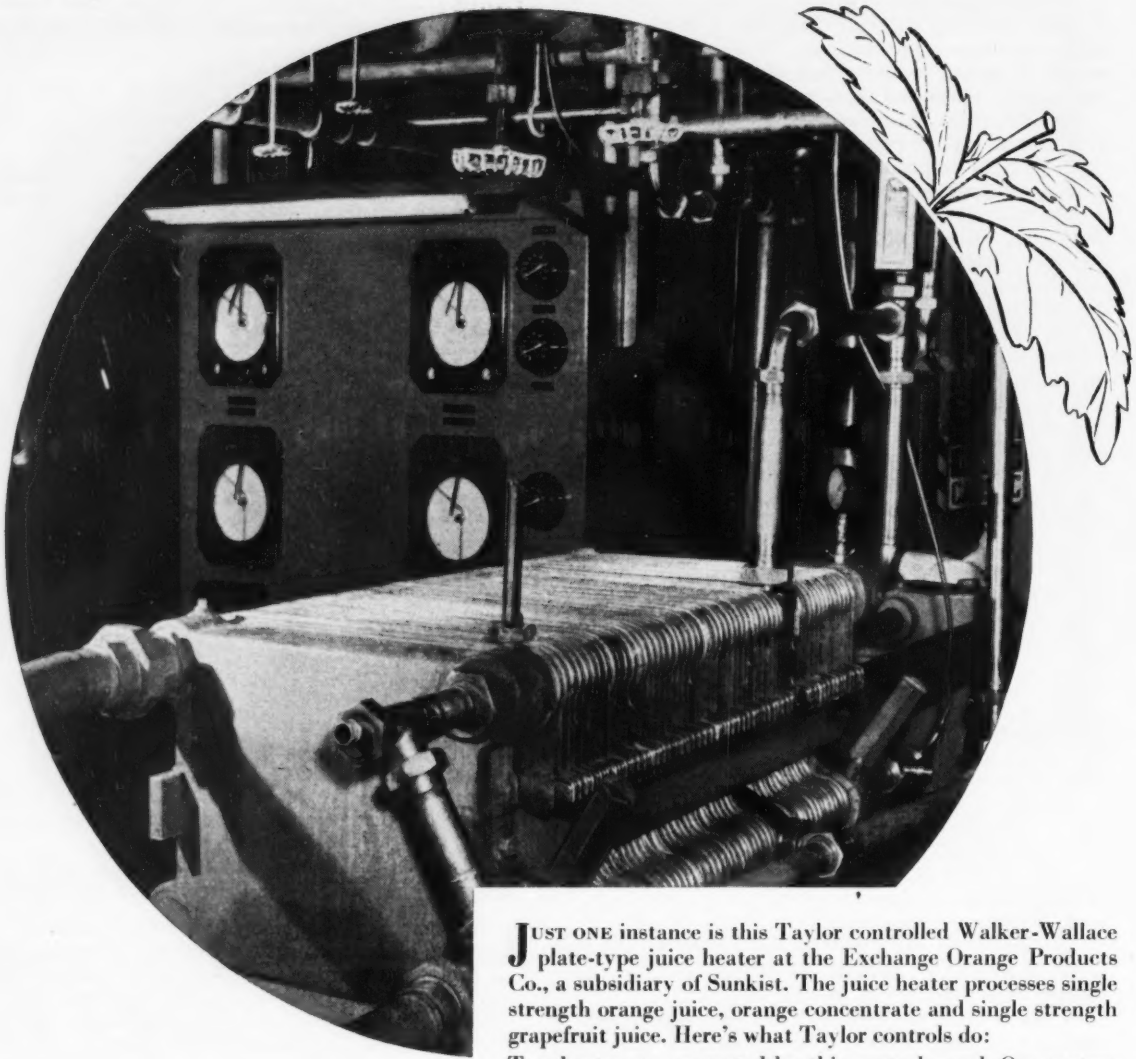
While true fruit flavors do taste more natural than imitation ones, it would be wrong to conclude that they are better for every use.

For example, imitation flavors are better suited for the following applications:

1. Where strong heat is applied as for instance in bakery products. Due to flavor loss, uneconomically high proportions of true fruit flavors are necessary to do job. Also heat will give flavor a "jam-like" note, so that taste advantage is offset anyway.

2. Where a minimum moisture content is desired and where large surface action hastens oxidation, as for instance in gelatin, puddings, and summer drink powders.

(Turn to page 129)



How Taylor Instruments help Sunkist squeeze the last drop!

JUST ONE instance is this Taylor controlled Walker-Wallace plate-type juice heater at the Exchange Orange Products Co., a subsidiary of Sunkist. The juice heater processes single strength orange juice, orange concentrate and single strength grapefruit juice. Here's what Taylor controls do:

Two heaters are operated by this control panel. One system of the Dubl-Duty FULSCOPE* Controller regulates the hot juice temperature. The other system adjusts a Taylor Sanitary 3-Way Throttling Diversion Valve to by-pass the regenerative section and maintain controlled juice temperature.

86R FULSCOPE Indicating Temperature Control measures hot juice temperature and operates a Taylor Sanitary-type 3-Way Flow Diversion Valve which automatically returns improperly pasteurized juice to plate cooler for re-pasteurization.

Recording Thermometer with low temperature electric alarm system continuously records juice temperature in filler bowl and signals operator if temperature falls too low. The THERMOGUIDE Dial Thermometers indicate storage tank temperatures. Taylor charts, checked daily for operating time and correct set-points, become permanent production records.

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Taylor Instruments **MEAN ACCURACY FIRST**

TASK-EASING DEVICES and convenience products of modern living have been leading factors in changing our nutritional needs. (*Electrical Merchandising* photo)

NUTRITION RESEARCH Highlights Role of Ingredients

Revised calorie allowances, based on age, sex, body size, climate, and activity, emphasize foods of high nutritive quality. Calcium, trace elements, new vitamins stressed

C. G. KING and H. L. SIPPLE

Respectively, Scientific Director and Executive Secretary, The Nutrition Foundation Inc., New York City

The bulletin, *Recommended Daily Dietary Allowances*, revised recently by the Food & Nutrition Board of the National Research Council, graphically illustrates the growing interrelationship between industrial or engineering technology and scientific knowledge in the field of nutrition.

Because of rapid and sweeping changes in modern technology, and in the science of nutrition, revisions in such basic guides are needed fairly frequently if they are to retain their value.

Advances in technology, for example, are altering working conditions for nearly all of our population by progressively reducing the amount of energy spent in different occupations.

Driving a tractor, for example, is less strenuous physically than mule driving, and an electric dishwasher has similar technical advantage for the housewife.

Most industrial jobs now are classified as "moderate" work. Several millions of our citizens are permitted the luxury of a reduction in energy output.

This attainment, however, has focused attention on the importance of adjusting calories to meet individual needs. But protein, vitamin, and mineral requirements decrease much less—scarcely at all—with a lightened work output. This changed ratio of other nutrients to calories creates an emphasis on foods of high nutritive quality.

Calorie Adjustment Needed

A second strong factor is the mounting evidence that excessive caloric intake over a long period of time, from whatever source, is not in the interest of good health. The accompanying table illustrates this trend toward recognizing the need for ideal body weight and assuring nutritive values in a totally balanced diet.

Recommended allowances are established on the basis of data existing at time revisions are made. In the judgment of the Board, they represent desirable goals toward which to strive in planning diets and food supplies for individuals and population

groups. When sufficient quantitative data become available, each specific recommended allowance is revised or added as a new item.

Weight Revised Downward

In the current revision, major changes relate to calories and calcium, plus additional notes regarding new data for trace mineral elements, newer vitamins, and protein allowance for infants.

Formerly, recommendations for adults were based on needs of a man weighing 154 lb., and for a woman weighing 123 lb. Their ages were not specified.

Since a weight of 143 lb. at age 25 corresponds fairly closely to the average weight of young men of military age in this country, this weight has been adopted as a basis for calculations for adult males.

New recommendations for calories take into account the tendency for adults, male and female, to gain weight after the age of 25. It is now proposed that the intake be decreased 5% for each decade after this age. The Table shows how these adjustments are made for adult males of ages 45 and 65. Similar illustrations for women are included.

Thus caloric allowances may be adjusted to fit the needs of those who differ in body size, age, and physical activity or who live in climates either colder or warmer than the standard of 50° F. agreed upon by the Board.

Development of this more flexible system was facilitated through study of the procedures of the Food & Agriculture Organization of the United Nations. The procedures take into account age, sex, body size, climate, and various levels of activity. Hence the revised allowances can reflect benefits gained from recent experience and from the cumulative research of past years.

Activity of Children

Because of the tendency to gain weight after 25, the Food & Nutrition Board recommends that caloric allowances be estimated on ideal weight, rather than on the actual weight of the body.

Increases in caloric allowance during pregnancy are made for the last three months only. Then 400 calories per day are added as a representative figure. This change is based on the evidence that the caloric cost of pregnancy is slight during the first six months, when compensations are made by apparent decreases in physical activity, and therefore in the amount of energy expended.

Caloric allowances for infants and children are about the same as in earlier tables. Variation in energy needs per unit of body weight during the first year of life is recognized, together with the greater caloric requirement of boys in the 10-12 age group. It must be emphasized that these individual recommendations are to serve as guides, rather than as hard and fast rules. There is more variation in individual requirements during the early years than there is among adults.

On the basis of new data, the adult's allowance for calcium has been reduced from 1.0 to 0.8 g. per day. The view is taken that the adult calcium allowance (excluding pregnancy and lactation) should provide for calcium equilibrium. But the desirability of continued calcium storage after completion of growth is a matter of conjecture.

Calcium Utilization

At present, data indicate that the body can adapt to varying levels of calcium intake, that individual variation in the efficiency of calcium utilization is great, and that calcium utilization is facilitated by a well-balanced diet.

Protein allowance remains at 1 g. per kilogram of body weight per day. Quantity of protein needed to prevent loss of body stores in infants and children is much greater than in adults. Amounts required vary with size of child and quality of protein. Under usual circumstances, needs will be satisfied with allowances of 3.5-4.0 g. per kg. of body weight in infants; 2.5-3.0 g. in early childhood; and 1.5-2.0 g. in late childhood.

Other essential nutrients have been kept at former levels, in recognition of the need for diets of high quality, as represented by the "protective" foods, when calories are decreased. Although at first glance, some of the figures appear to be changed, the quantitative basis for determining allowances remains the same and the different values are simply adaptations to the variations in body weight.

Trace Elements Stressed

Research of the past year has added to the list of nutrients essential in both plant and animal nutrition. Molybdenum, long recognized as an essential nutrient for plants, now has been identified as an essential part of at least one enzyme, xanthine oxidase, which facilitates the work of the liver and other organs.

Although a need for the mineral element, vanadium, has not been established in animal or human nutrition, it has been proved essential for the growth of green plants.

Role of zinc in plant nutrition is receiving greater attention. Large areas in California, Washington, and other Western states, also in Australia, have been found to require added amounts of zinc for increasing crop yields. In extensive areas of the U. S., added amounts of several trace mineral elements are a practical requirement.

Cobalt is one of the trace minerals in this group that includes molybdenum, zinc, manganese, and copper, all of which have been receiving scientific attention. Use of cobalt-containing salts has aided livestock growers in Australia and New Zealand in producing cattle yielding meat of a higher grade than had been possible previously.

Vitamin B_6 Deficiency

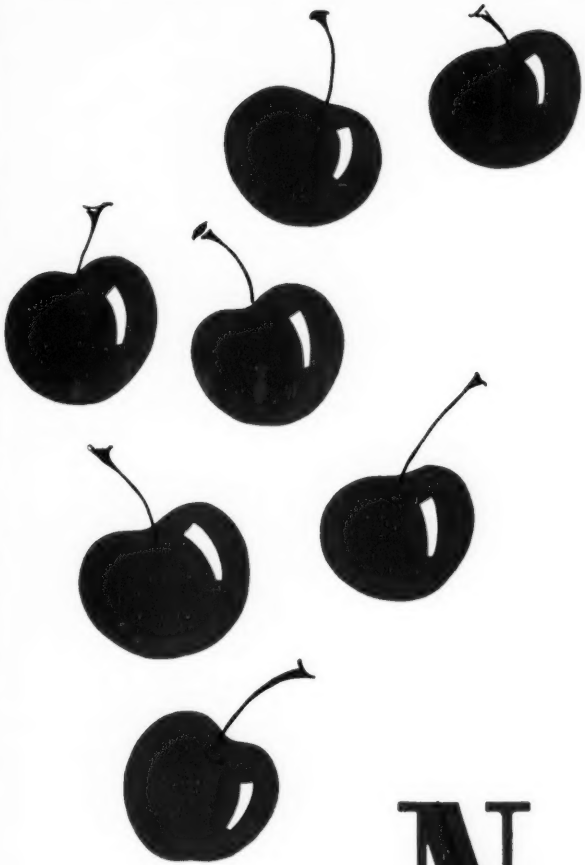
Greater interest in the role of vitamin B_6 in human diets was developed during the year. Possibility of encountering deficiencies of this vitamin during pregnancy had been recognized for some time. More recently, it was revealed that such a deficiency could occur during infancy. A similarity was recognized between convulsive seizures in infants on vitamin B_6-deficient diets and occasional attacks of that nature in babies fed a proprietary infant food. When this product was found to be low in vitamin B_6, corrective measures promptly were adopted by the manufacturer.

Three forms of the vitamin (pyridoxal, pyridoxamine and pyridoxine) are found in milk. Pyridoxal and pyridoxamine are more easily destroyed during heat processing. The more stable pyridoxine, therefore, is the form indicated for use in fortification of food products undergoing autoclaving or other high temperature treatments.

Low Sodium Diets

Discoveries in the field of medicine have revealed that concentration of salt, or more properly the sodium ion, has great significance in the diet of persons suffering from specific ailments. Although salt, per se, is not usually added to frozen vegetables, use of a brine separator, to remove the more mature vegetables and separate different quality grades, can increase the salt content, even though the vegetables are washed thoroughly afterward.

In Nov., 1953, FDA issued a statement of general policy regarding labeling of frozen vegetables and certain foods for special dietary use, relative to the salt content, as a means of



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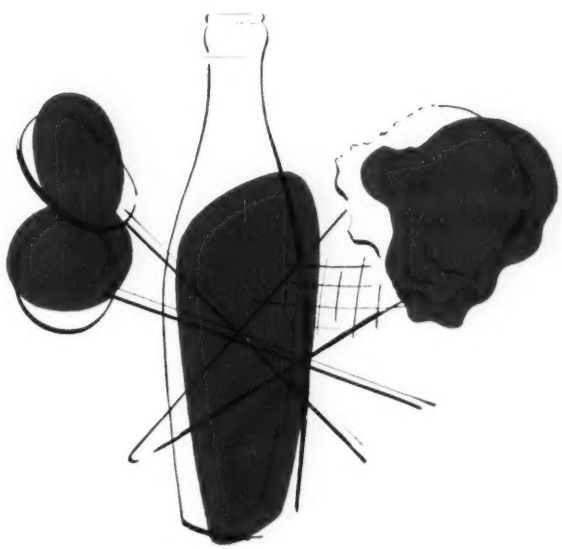

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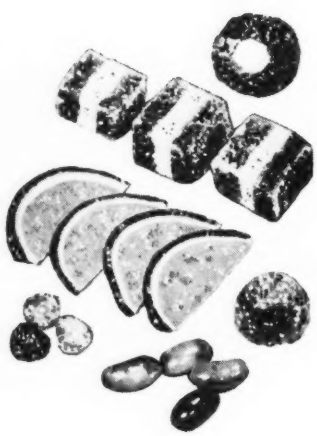
Whether it's a corn starch for candy

or for cookie doughs, wire cut goods, canned corn, marshmallows, pie fillings or use on the mogul . . .



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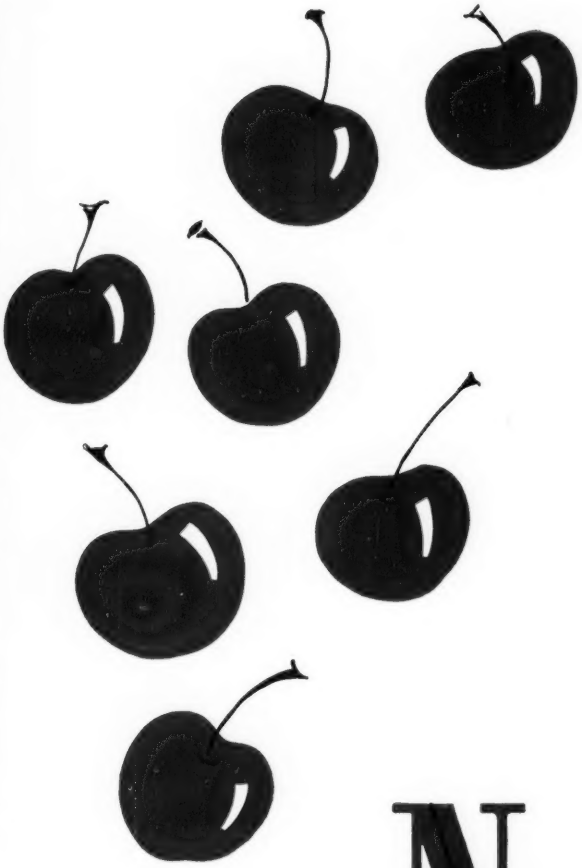

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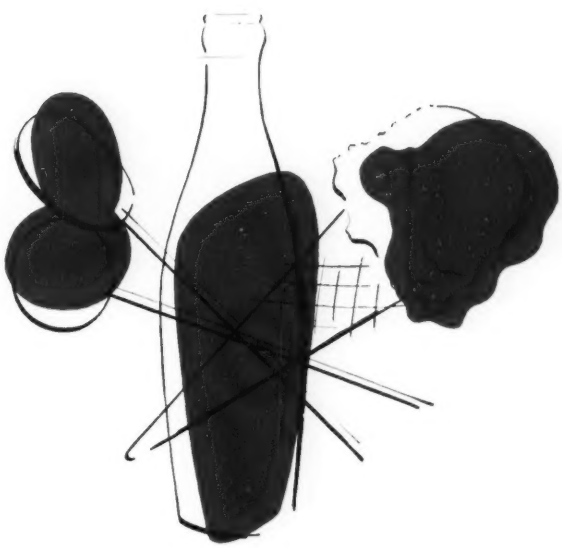

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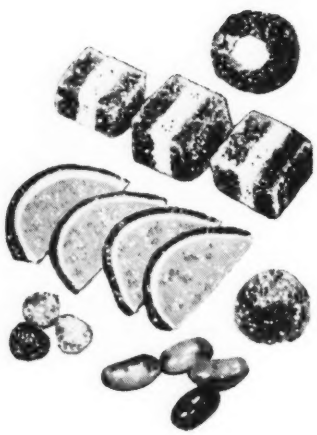

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regulating the intake of sodium: ". . . the label shall bear a statement of the number of milligrams of sodium in 100 g. of such food."

The therapeutic effectiveness of low sodium diets has led to the development of low sodium food products, including low sodium milks.

Antibiotics Tried

Although relative success attended experimental work in which antibiotics were mixed directly with foods primarily as a means of preventing or retarding spoilage, there are strong indications also that the consumption of foods containing added antibiotics may bring potential hazards. FDA has decided, therefore, that such use may constitute a public health hazard and has stated that ". . . the direct or indirect addition of such drugs to such foods, may be deemed an adulteration."

FDA has given tentative approval to the use of sorbic acid-bearing wrappers on cheese. Interest in the use of this acid as a fungistatic agent for foods stemmed from research indicating (1) Its harmlessness as a dietary component, (2) its superiority to sodium benzoate, since only small amounts are needed; and (3) its feature of metabolizing fairly readily.

Guided by research, the production of fats from domestic materials has increased about 25% since the war years, helping to overcome the world shortage of edible fats existing at that time. An important technological factor is the growing interchangeability between soybean oil and cottonseed oil in the manufacture of consumer food fats.

Acreage limitations on corn, cotton, and wheat may cause farmers to increase plantings of soybeans, and there are indications that sesame seed production may be increased.

Gamma Ray Sterilization

A possible new use for waste products of nuclear fission is food sterilization by gamma irradiation. However, there is need for extensive research and development work before applications will be feasible. When the stability of vitamins in dairy products was tested following irradiation by gamma rays from cobalt 60, vitamins A, E, carotenes, ascorbic acid, and riboflavin were found to be easily destroyed. The enzyme phosphatase was inactivated only very slightly. There is also a great risk of inducing rancidity.

In experiments with green plants, a positive correlation between initial ascorbic acid content of the plants tested and their relative resistance to irradiation was noticed. An understanding of phenomena of this nature may lead to methods of improved protection against radiation.

Liquid Fission Products

At present a research program built around use of a new energy source equivalent in radiation intensity to several pounds of radium is in progress of development at the Massachusetts Institute of Technology, under the sponsorship of the Atomic Energy Commission. Prepared by mixing into cement the liquid radioactive fission products created when neutrons bombard uranium 235, this new energy source produces gamma rays similar to those from radioactive cobalt (See item, FE Apr., p. 208).

Use of these new materials is a significant step in developing peacetime applications for atomic energy.

New Findings Point Way to Better Tailored Foods

DAILY DIET ALLOWANCES for Maintenance of Good Nutrition of Healthy Persons in USA. Revised 1953.* (Considered to apply to persons normally vigorous and living in temperate climate.)

Age and Sex	Weight Pounds	Height Inches	Calories	Protein g.	Calcium g.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflavin mg.	Niacin mg.	Ascorbic Acid mg.	Vitamin D I.U.
Adults												
Men												
25 years.....	143	67	3200**	65	0.8	12	5000	1.6	1.6	16	75	
45 years.....	143	67	2900	65	0.8	12	5000	1.5	1.6	15	75	
65 years	143	67	2600	65	0.8	12	5000	1.3	1.6	13	75	
Women												
25 years.....	121	62	2300**	55	0.8	12	5000	1.2	1.4	12	70	
45 years.....	121	62	2100	55	0.8	12	5000	1.1	1.4	11	70	
65 years.....	121	62	1800	55	0.8	12	5000	1.0	1.4	10	70	
Pregnancy (3rd trimester).....			Add 400	80	1.5	15	6000	1.5	2.0	15	100	400
Lactation (850 ml. milk daily)			Add 1000	100	2.0	15	8000	1.5	2.5	15	150	400
Children up to 10 Years												
Infants***												
1 to 3 months.	13	24	kg. × 120	kg. × 3.5	0.6	6	1500	0.3	0.4	3	30	400
4 to 9 months.	20	28	kg. × 110	kg. × 3.5	0.8	6	1500	0.4	0.7	4	30	400
10 months to 1 year.....	22	30	kg. × 100	kg. × 3.5	1.0	6	1500	0.5	0.9	5	30	400
1 to 3 years.....	27	34	1200	40	1.0	7	2000	0.6	1.0	6	35	400
4 to 6 years.....	40	43	1600	50	1.0	8	2500	0.8	1.2	8	50	400
7 to 9 years.....	59	51	2000	60	1.0	10	3500	1.0	1.5	10	60	400
Children over 10 Years												
Boys												
10 to 12 years..	78	57	2500	70	1.2	12	4500	1.3	1.8	13	75	400
13 to 15 years..	108	64	3200	85	1.4	15	5000	1.6	2.1	16	90	400
16 to 20 years..	139	69	3800	100	1.4	15	5000	1.9	2.5	19	100	400
Girls												
10 to 12 years..	79	57	2300	70	1.2	12	4500	1.2	1.8	12	75	400
13 to 15 years..	108	63	2500	80	1.3	15	5000	1.3	2.0	13	80	400
16 to 20 years..	120	64	2400	75	1.3	15	5000	1.2	1.9	12	80	400

* In planning practical dietaries, recommended allowances can be attained with a variety of common foods that will also provide other nutrient requirements less well known. Allowance levels are considered to cover individual variations among normal persons as they live in the United States subjected to ordinary environmental stresses common thereto.

** These calorie recommendations apply to degree of activity for reference man and woman. For urban "white-collar" worker, they are probably excessive. In any case, calorie allowance must be adjusted to actual needs of individual as required to achieve and maintain his desirable weight.

*** Recommendations for infants pertain to nutrients derived primarily from cow's milk. There should be no question that human milk is a desirable source of nutrients for infants, although intakes may not provide recommended levels of certain nutrients.

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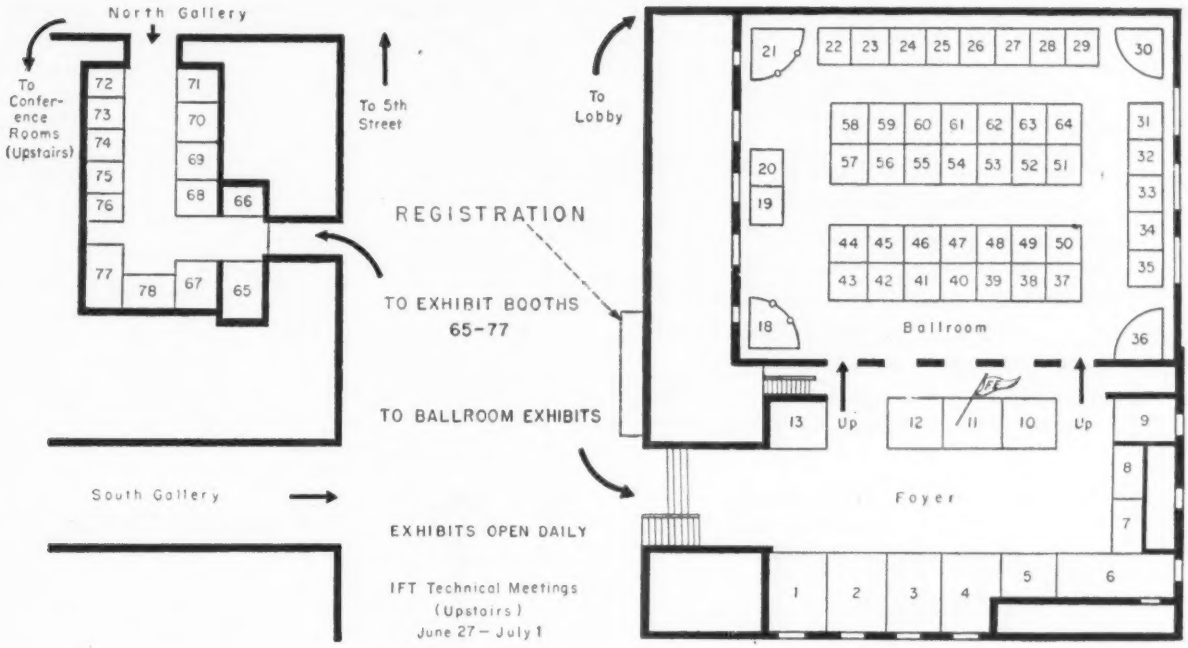

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Institute of Food Technologists

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S—Stange Co., Wm. J. 23
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Taylor Instrument Cos. 1

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W—Walker-Wallace, Inc. 29
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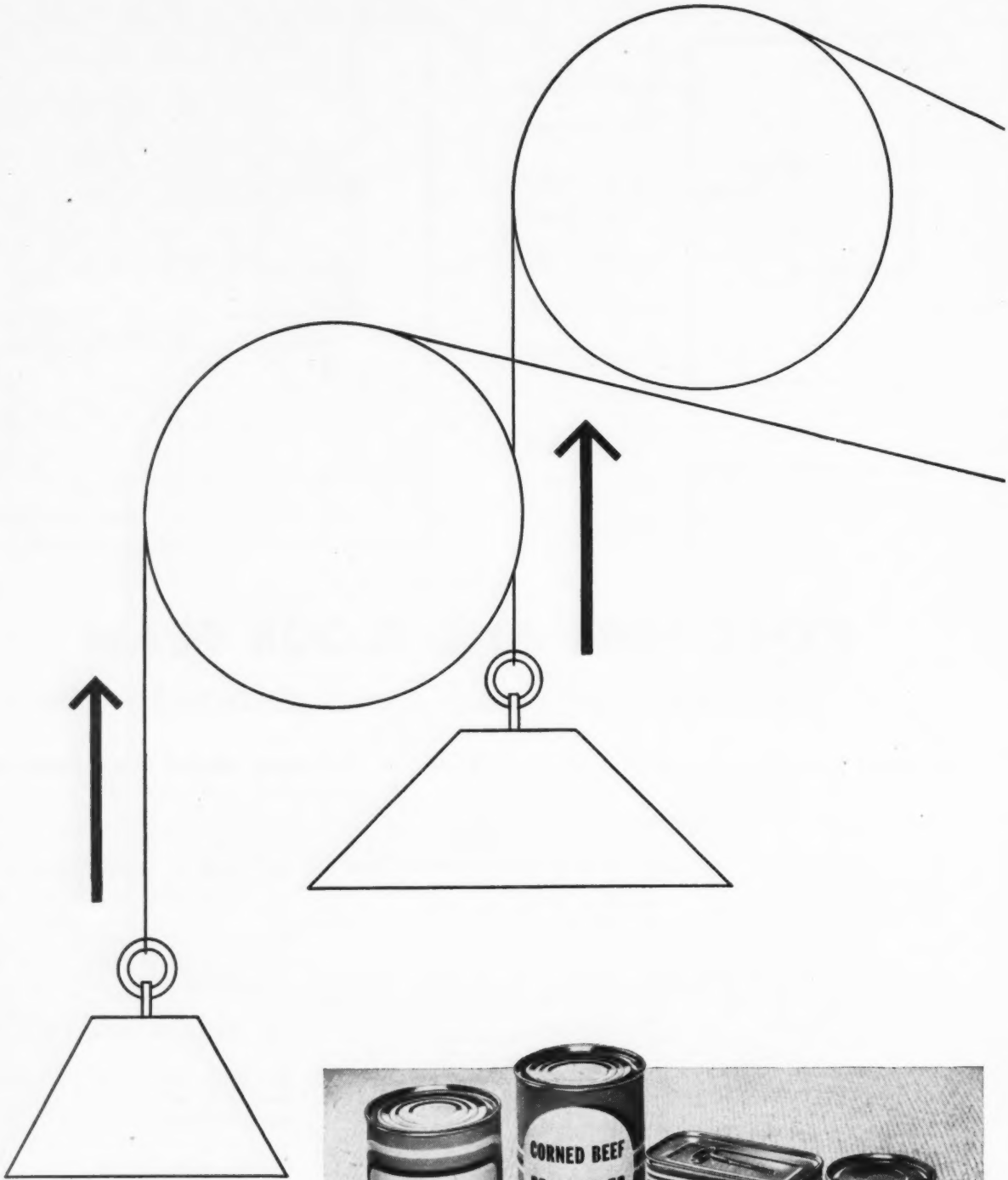

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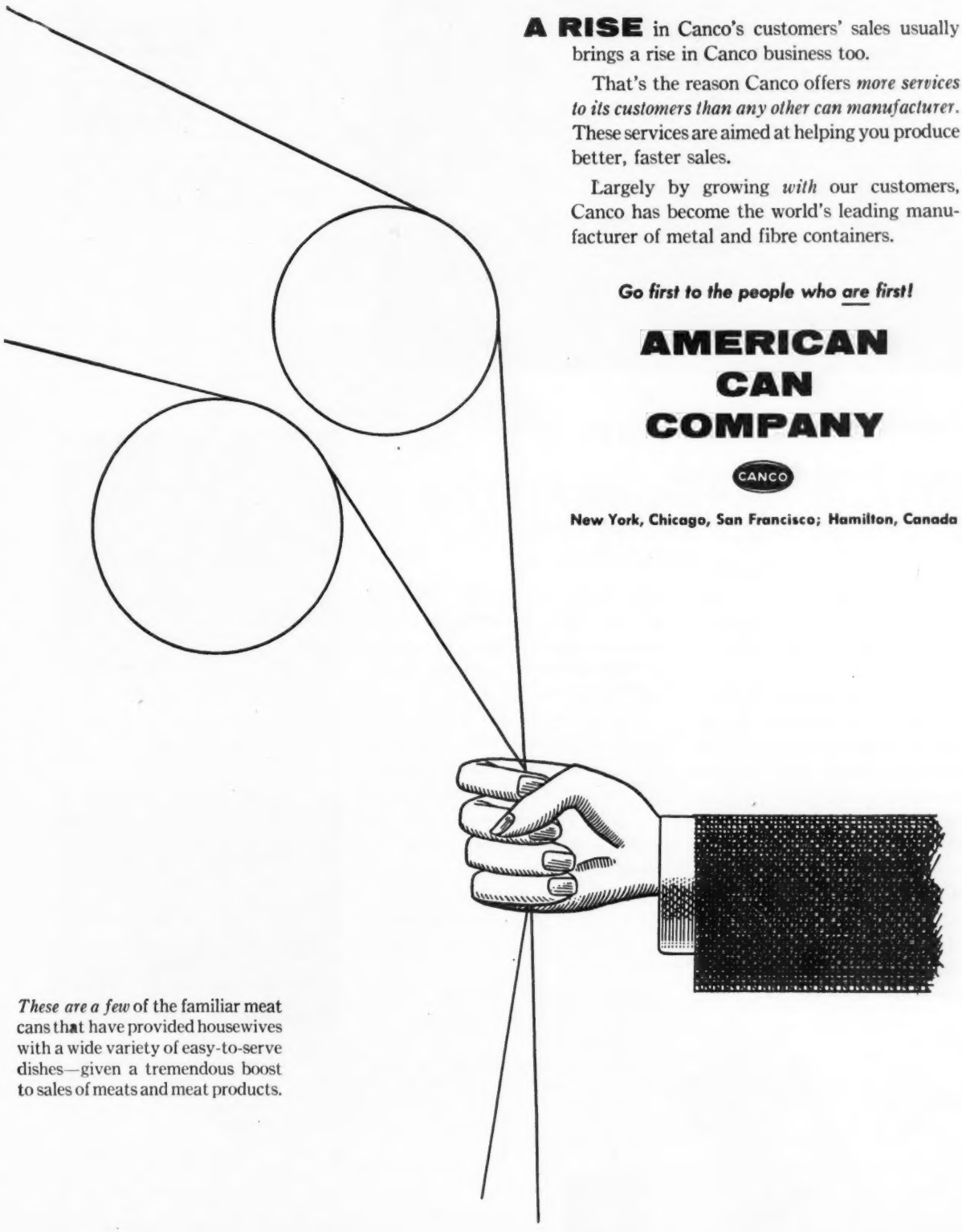

A RISE in Canco's customers' sales usually brings a rise in Canco business too.

That's the reason Canco offers *more services to its customers than any other can manufacturer.* These services are aimed at helping you produce better, faster sales.

Largely by growing *with* our customers, Canco has become the world's leading manufacturer of metal and fibre containers.

Go first to the people who are first!

AMERICAN CAN COMPANY

CANCO

New York, Chicago, San Francisco; Hamilton, Canada

These are a few of the familiar meat cans that have provided housewives with a wide variety of easy-to-serve dishes—given a tremendous boost to sales of meats and meat products.

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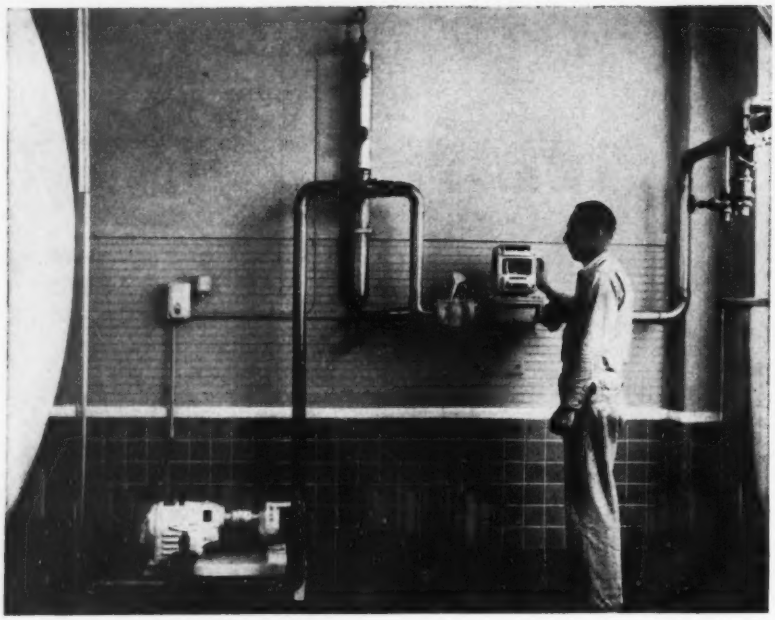

Simple Metering System Boosts Trend to Liquids For Lower Materials Handling Costs

Many ingredients can be handled more economically, with closer formula control, by converting from bulk solids to liquids.

Liquid sugar, for example. It's delivered by tank truck to a simple storage and pumping system in your plant. Put a Neptune Auto-Stop meter at each mixer or kettle and you literally have "push-button control." You just push buttons on the meter to set the quantity, open the valve, and the Auto-Stop shuts off *automatically* . . . "on the nose."

You make these savings: (1) Fewer rejected batches; (2) no heavy bags to lug, no scale weighing; (3) no sifting or spills, hence fewer rodent problems; (4) save valuable storage space by placing tanks in cellars or on roofs; (5) cut hidden losses, get easier inventory figures.

Neptune meters now handle more than 150 different liquids. Capacities from 2 to 1000 gpm., bronze construction. Registers range from simple counters to electrical switch controls for pumps, valves, agitators. Write or phone for details.

NEPTUNE METER COMPANY
50 West 50th Street • New York 20, N. Y.

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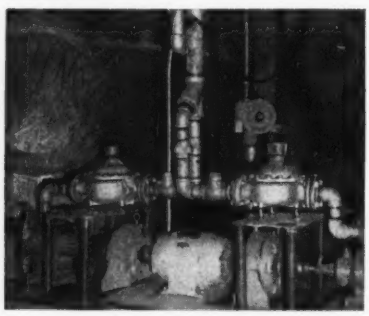
Ask for Bulletin 566-TF

(ADVERTISEMENT)

36 Different Ingredients Handled by Liquid Meters, 174 Food Plants Report

Accurate control of batch mixing, general process control, and inventory control are the three biggest advantages offered by positive displacement meters now in use in their plants, according to executives and technologists in 174 food companies in a recent survey. Discussing applications for meters of the type manufactured by Neptune Meter Company, more than 36 liquids were reported, including water (hot and cold), corn syrups, liquid sugars, and other sweeteners; cocoa butter, cocoanut oil, and other fats and oils, chocolate, flavors, coffee, wine, alcohol and many others. Most desirable feature for accurate batching was said to be the automatic quantity cut-off (Neptune Auto-Stop). Other types in use includes round-dial registers for manual batching or periodic readings, and simple totalizing registers used where infrequent readings for inventory control were required.

You simply push the buttons on this Model 432 Auto-Stop meter to set the pounds or gallons required by the formula, open the valve, and the meter shuts the valve automatically at the required amount.



These Neptune Meters with simple totalizer registers measure liquid sugar drawn from storage tanks, keeping tabs on inventory. Neptune batching meters also have totalizer counters, so accurate records can be kept.

Helpful Information Offered

Information helpful in selecting the right liquid meter for any specific application is offered free. Ask for bulletin 566 TF. Neptune Meter Company, 50 W. 50 St., New York 20, N. Y.

"Naturally," Food Sells Better...

When You Sell

NATURAL FRESH FLAVOR

intensified by Zest®

ZEST brings out the true garden-fresh flavor that nature put *into* your vegetables . . . prevents the gradual "flavor-fading" that may be robbing your brand of profit-making taste appeal. Step up quality with fuller flavor. Add ZEST, Staley's 99+% pure monosodium glutamate, to your canned and frozen vegetables, soups, fish, stews, poultry . . . and scores of other foods.

ZEST intensifies natural flavor *already in* your foods without adding flavor, aroma or color of its own. Freezing reduces the level of amino acids. ZEST restores this loss. ZEST is effective in tiny amounts either before, during or after processing. After using ZEST, food processors instantly notice a marked flavor improvement. Write today for all the details about the seasoning that makes foods sell better!

Zest®

PRODUCTS FROM CORN
Staley's

Staley's 99+% Pure Monosodium Glutamate

A. E. Staley Manufacturing Co., Decatur, Illinois

Mail this coupon for the complete ZEST story.

A. E. Staley Mfg. Co.
Dept. FE-6, Decatur, Illinois

Gentlemen: Send me all the facts about ZEST—the amazing seasoning that boosts natural food flavors.

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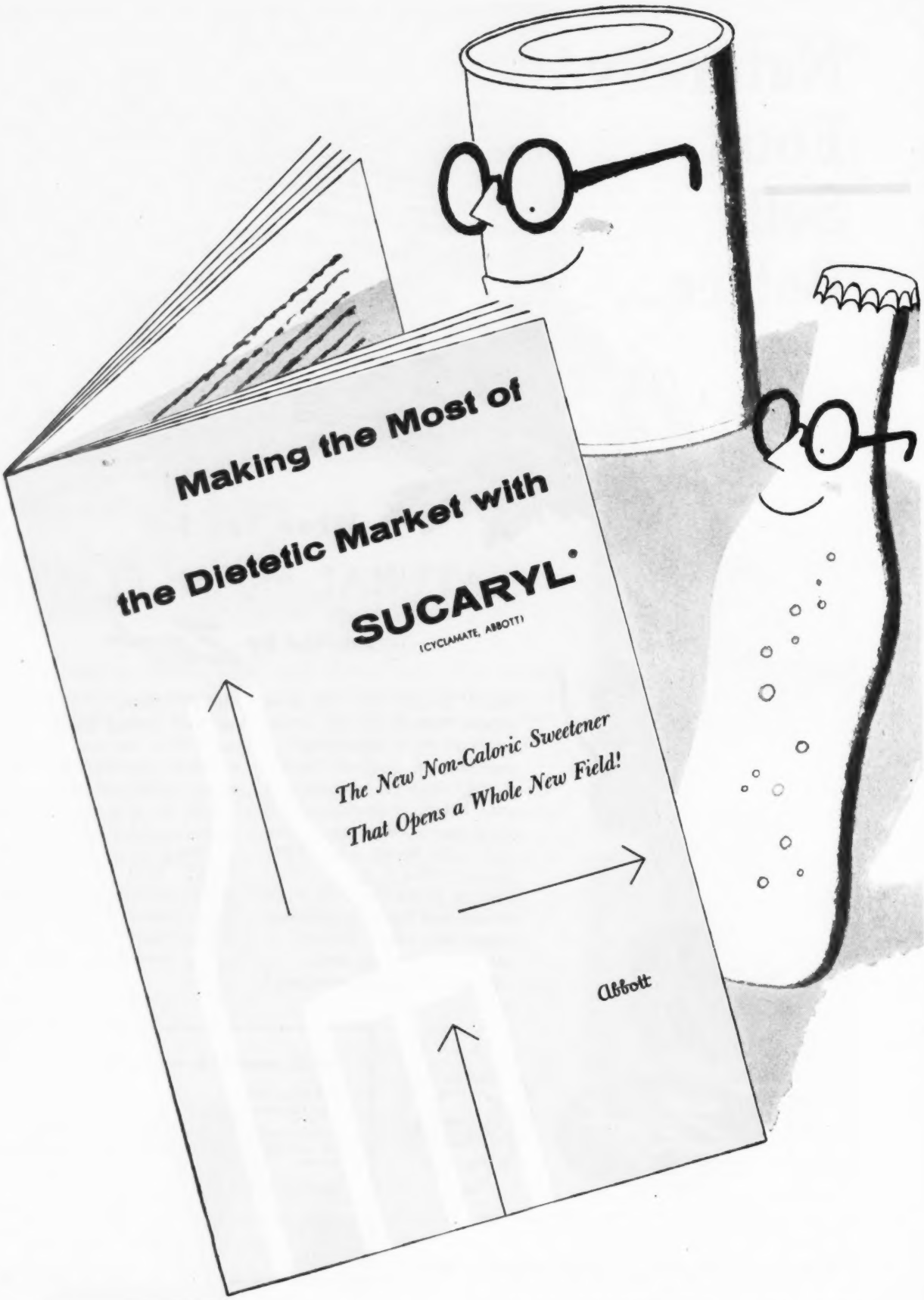
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SUCARYL®
(CYCLAMATE, ABBOTT)
The New Non-Caloric Sweetener
That Opens a Whole New Field!
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Get the facts—*all of them*—about SUCARYL and the booming market for non-fattening soft drinks and foods! This new, informative booklet tells you how SUCARYL, the sensational non-caloric sweetener, can be used in your product . . . how SUCARYL will enable you to make the most of the fastest growing field in the beverage and food industries. It tells how SUCARYL was developed . . . how it was tested . . . plus all technical data! It's required reading for anyone who wants to know all the answers about the biggest business opportunity that's come along in years. If that means you, send for this free booklet today!

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ABBOTT LABORATORIES
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Please rush a free copy of "*Making the Most of the Dietetic Market—with* SUCARYL" to:

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ATT'N:_____

Use coupon on page 181.

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PCC

PRECIPITATED CALCIUM CARBONATE U.S.P.

For Salt and Sugar—When you blend, Sturge PCC insures free-flowing salt and sugar. No caking, even when it's humid. No grit. No extra taste.

For Baking Soda—Sturge PCC prevents premature action of baking soda—even in "double-action" powders. It stabilizes but doesn't effect leavening. No discoloring. No loss of texture.

For Enriching—Fortify your flour and cereal foods with Sturge PCC . . . or add to their calcium content by just incorporating in your baking powder formula.

For Dusting—Use Sturge PCC for coating your molds, to protect the appearance of your finished product, to prevent adhesion to the wrapper.

The producer, John & E. Sturge, Ltd., of Birmingham, England, will meet your special density requirements. For a sample and further information write on your company letterhead to H. J. Baker & Bro.

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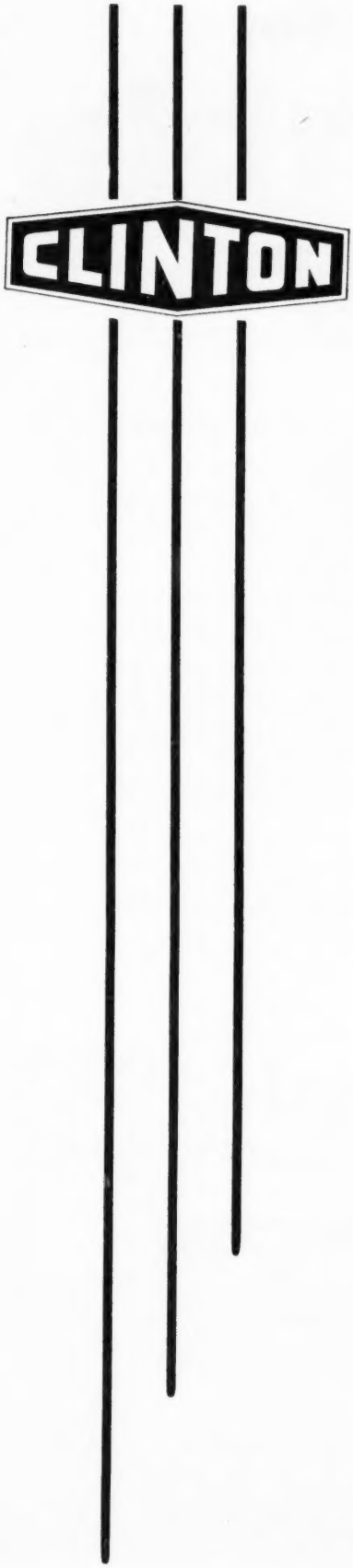

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CORN PROCESSING DIVISION

CLINTON IOWA

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Call on Ac'cent for dependable supply

With capacity now doubled, new packaging plant now completed, Ac'cent achieves greater volume, greater efficiency...and greater economies!

TO ALL FOOD PROCESSORS:

The pictures on this page show why Ac'cent can assure food processors an always dependable supply of pure monosodium glutamate. They show how our production facilities have grown with the steadily increasing demand for monosodium glutamate—in fact, how we have kept ahead of the demand.

In the last two years alone we have more than doubled the capacity of our Ac'cent plant at San Jose, California—the world's largest plant producing monosodium glutamate exclusively. The resulting increase in efficiency has helped to place us in a favorable position on unit costs—an advantage that will help our customers as well as us.

And with a relatively small expansion of facilities we are capable of increasing our present record output at San Jose by another 50 per cent.

At our original plant in Rossford, Ohio, we have increased operational efficiency. This plant's ability to produce monosodium glutamate from four different raw materials is further assurance of a dependable supply.

Better distribution and greater speed of delivery have resulted from the opening of our new centrally-located 22,000 square-foot warehouse and packaging plant in Chicago.

We believe that the food processing industry is going to continue its amazing growth of the past fifteen years. We believe that in an increasingly competitive market more and more processors are going to turn to monosodium glutamate for that flavor advantage which may be the deciding factor over competing products.

We anticipate a much greater demand in the future for monosodium glutamate—and we are prepared to supply our customers with their full requirements at reasonable prices—any time...any place...and in any amount.

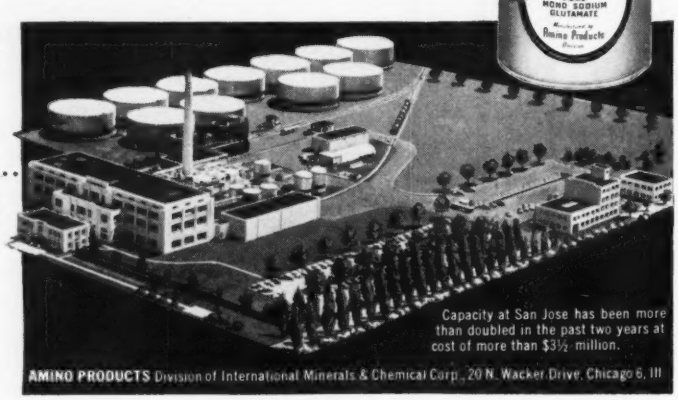
George B. Hamilton
GENERAL MANAGER, AMINO DIVISION

B C Peterson
SALES MANAGER, FOOD PROCESSING DEPARTMENT

Ac'cent®
PURE MONOSODIUM GLUTAMATE
...builds natural food flavor!

Our new 22,000 square-foot warehouse and packaging plant in Chicago assures efficient distribution and quick delivery.

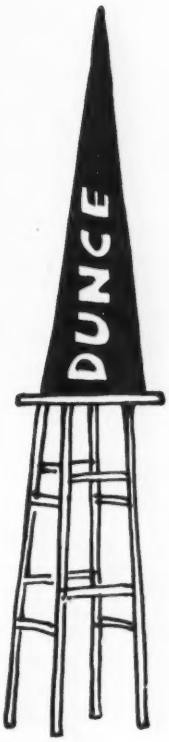
Our Rossford, Ohio, plant—where we started—can produce from four different raw materials.



Capacity at San Jose has been more than doubled in the past two years at cost of more than $3½ million.

AMINO PRODUCTS Division of International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill

When Nature Hasn't Played Fair with a Grape



You sometimes have to give Nature a boost, for the sake of your own pocketbook. That's when Norda can be a big help.

Here's how it works:

You use Norda genuine natural fruit Flavors, because they give your products real true-fruit taste. They're rich and wonderful.

Maybe, though, it's not profitable to use *all* natural fruit flavors. Then "piece them out" and supplement them with Norda imitation Flavors. They have the same fine characteristics. They're full-bodied, true to type, almost indistinguishable from the genuine. You can economize with them, without skimping on strength or quality.

Norda Grape Flavor will show you. Let us send you *free* samples of both genuine and imitation. Send your request today.

–Come to Norda

Use a Norda "Favorite to Flavor It"

Norda

Norda, Inc., 601 West 26th Street, New York 1, N. Y.

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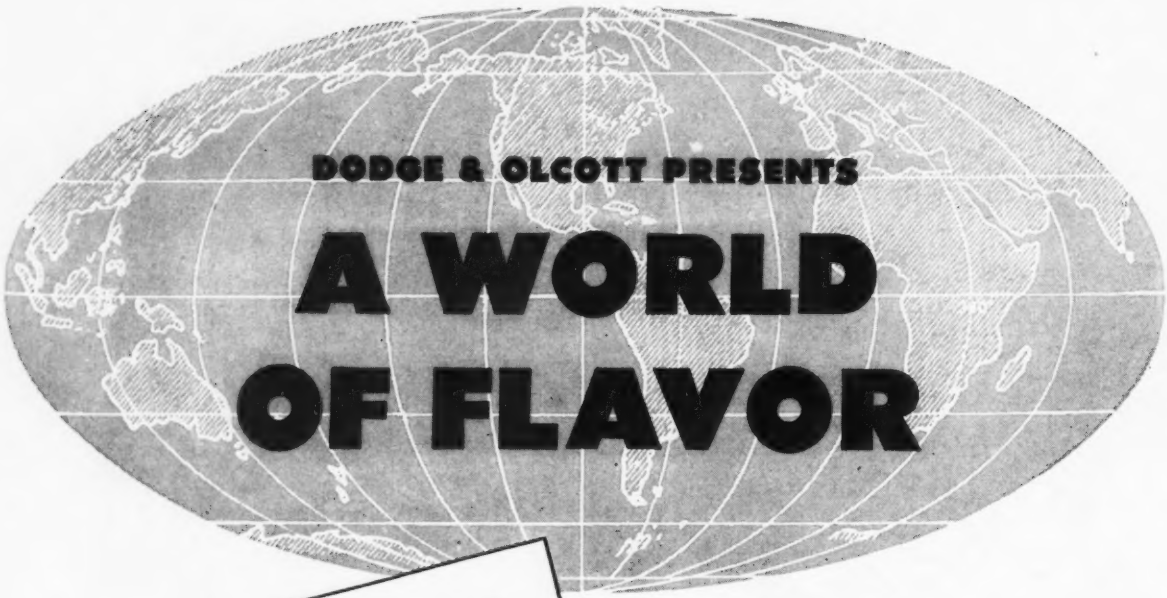

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Brought from the far corners of the earth... processed into specific forms required by all the varied segments of the food industry...

The D&O World of Flavor comes to you through the courtesy of international markets, the D&O Flavor and Product Development Laboratories and the Annual Meeting of the Institute of Food Technologists in Los Angeles, June 27-30. See how a single spice or herb can be prepared in seven different forms for specific flavoring application. See and test the differences between the Essential Oil, Oleoresin, Spiceolate, Spisoresin, Dry Soluble Seasoning, Concentrate and Synthetic Compound of a specific natural product. Visit the D&O Booth, #7 and #8, for your tour of, "A World of Flavor".

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GET ACQUAINTED WITH SORBITOL...

a wholesome food ingredient with exceptional properties

Sorbitol possesses unusual qualities as a food ingredient. Its ability to improve storage life by stabilizing moisture and retaining softness, its non-volatile nature, mildly sweet flavor and established nutritive properties have encouraged widespread examination by food technologists. It has been found to give improved characteristics to a variety of food products.

A naturally occurring ingredient of many edible fruits and berries, sorbitol is made commercially by hydrogenating common sugars. It is produced in quantity by Atlas at economical cost, by the hydrogenation of corn, cane and beet sugars. It is available as SORBO® (70% solution) and as crystalline powder or pellets.

For samples and technical assistance in application to your own product, write or call Atlas today.

FOOD INDUSTRY DIVISION

ATLAS

CHEMICALS DEPARTMENT
ATLAS POWDER COMPANY
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ATLAS POWDER CO., CANADA, LTD.
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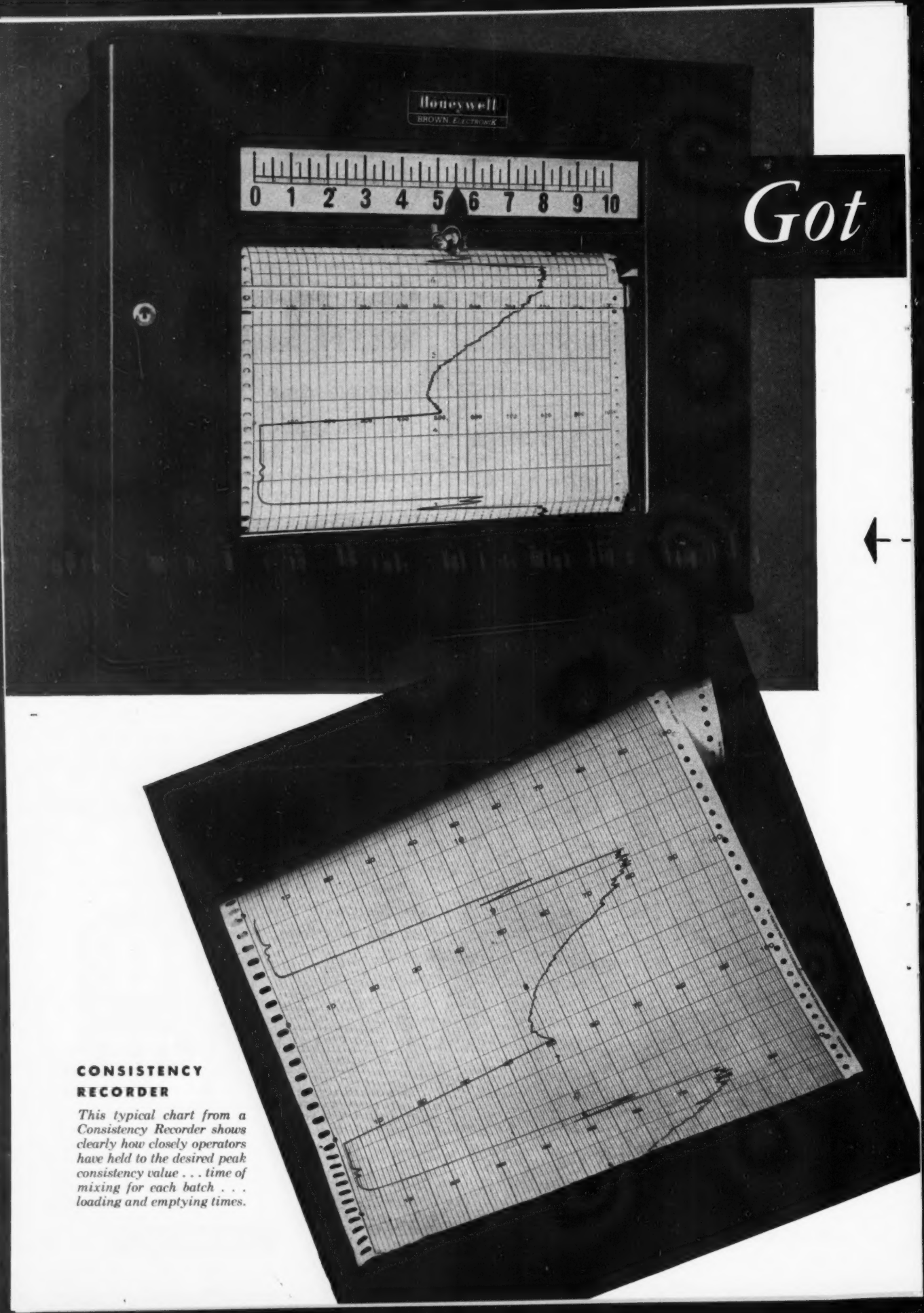
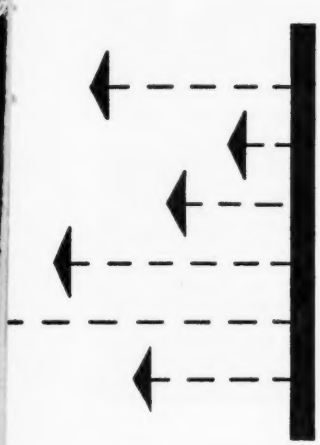


Got

CONSISTENCY RECORDER

This typical chart from a Consistency Recorder shows clearly how closely operators have held to the desired peak consistency value . . . time of mixing for each batch . . . loading and emptying times.

a mixing process?



here's an accurate, sensitive way to measure consistency

WHEN MATERIALS are mixed, it is often desirable to bring the product to a specified consistency and stop the process as soon as the optimum point is reached. Over or under-mixing may detract from the texture, grain or volume of the finished product. Marked changes in consistency may also indicate the end point of a chemical reaction, which should be allowed to proceed no further once it has reached a predetermined phase.

For these applications the *ElectroniK* Mixture Consistency Recorder offers an automatic, accurate means of continuously measuring and recording the consistency of the material in your mixer.

Measures Motor Input Power

It works on a simple principle. It measures the electrical power required to drive the mixer motor. When consistency increases, so does the drag on the motor. By recording the power input to the motor, a sensitive, readily reproducible measurement is obtained which is directly related to product consistency.

Operators find the *ElectroniK* instrument's record an easily understood index to process operation. They can see abnormal variations readily, and can tell exactly when the desired end point is reached. And management can use this same chart as a permanent record of production rates, machine stoppages and uniformity of processing.

Applicable to practically any mixer, the consistency recording system uses components that have been proved in thousands of industrial installations. Your nearby Honeywell sales engineer will be glad to discuss your specific application . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA: Write for Data Sheet No. 3.6-7, "Dough Mixing."**

MINNEAPOLIS **Honeywell**
BROWN INSTRUMENTS
First in Controls

These Flo-Sweet services cut your sugar costs

"Talk about service—we even help you plan ahead!" exclaims your Flo-Sweet Engineer. "That's why, when you use Flo-Sweet, you get greater satisfaction at every step. From the time you first consider liquid sugar, during equipment layout and installation, up through carefully timed deliveries—the Flo-Sweet technical staff is at your service. Here are six important ways they can help you save."

FORMULA CONVERSION

Flo-Sweet specialists readily convert your present dry sugar formulas to liquid.

RESEARCH

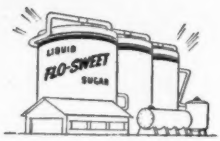
Flo-Sweet laboratory technicians have long experience in helping customers solve problems involving sugar.

SUGAR SYSTEM LAYOUT

Flo-Sweet engineers' quarter century's experience with liquid sugar systems saves you time and expense.

STORAGE

Flo-Sweet's huge storage facilities free you from carrying costly sugar inventories.

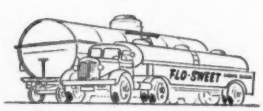


SPECIAL EQUIPMENT

Design and installation of special sugar handling and processing equipment are routine procedures for Flo-Sweet engineers.

DELIVERIES

Flo-Sweet has set the pace for the industry in prompt liquid sugar deliveries.



There's excitement and drama in the history of liquid sugar! Get the inside story in "Pursuit of an Idea"—write for your free copy today.

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SERVING INDUSTRIAL SUGAR USERS EXCLUSIVELY

PURITY® NCS

A New Starch Thickener Reduces Weeping or Separating

pack corn today

CREAM STYLE

ship tomorrow

PURITY NCS for cream style corn reduces weeping or separating during long shelf life. The consistency changes very little even after six months' storage.

PURITY NCS cooks at a higher temperature than regular corn starch. It gelatinizes only partially in the kettle. Complete cooking takes place on retorting with little breakdown. It offers unusual resistance to retrogradation when stored at normal temperatures.

All of which means that the corn you pack today may be shipped tomorrow . . . *at considerable rehandling and inventory savings to you!*

PURITY NCS is also ideal for soups, sauces and gravies.

National
STARCH PRODUCTS

Address: 270 Madison Ave., New York 16

3641 S. Washtenaw Av., Chicago 32 • 735 Battery St., San Francisco 11 • Boston • Philadelphia • Atlanta • Houston • Indianapolis • and other principal cities.

CLEARJEL® is a modern stabilizer with an old fashioned way with canned fruit pie fillings. There is no interfering with nature. Sun ripened fruit colors sparkle in clear, smooth, creamy textured fruit juices. Fruit flavors have orchard freshness.

CLEAR JEL

For Canned Fruit Pie Fillings

CLARITY · STABILITY

We'd like to talk with you about:

- ☐ **PURITY NCS** for cream style corn
- ☐ **CLEARJEL** for canned fruit pie fillings
- ☐ **FLOTEX** for processing at lower temperatures
- ☐ **PURITY SDW** for processing at extremely high temperatures

Use coupon on page 181.

words that speak of action!

Here are examples of the way Pfizer products are now being used to cut processing

Packers can cut smokehouse time of cooked, cured, comminuted meats by ⅓ or more with Pfizer Ascorbic Acid or Sodium Ascorbate. In many instances these products give better color retention. They are easy to use . . . simply dissolved in water and added near the end of the chop. Inexpensive, too . . . averaging approximately a quarter-cent for each pound of finished product.

A smoother, creamier tasting product is the result of emulsifying process cheeses with Pfizer Sodium Citrate. This pleasant-tasting salt of citric acid improves the slicing characteristics . . . makes process cheeses non-crumbling and uniform. It serves ideally, too, for cheeses that are to be remelted in cooking, making possible the smooth, even quality all cooks desire.

It takes only a few words to get action

when you're dealing with your Pfizer sales representative

Suppose, for instance, you are seeking advice on giving one of your present food products more sales appeal. Or, you may be considering the production of a new or improved product. On the other hand, you may be finding that excessive processing costs are threatening to price your line out of the market. Whatever your problem, discuss it with your Pfizer sales representative. He may find the answer in the vast experience Pfizer has gained in working with the food processing industry for nearly a century.

costs or to add sales appeal to foods and beverages.

Carbonated beverages enriched with Vitamin B_1 and Vitamin C have already proved to be big sales getters. Additional experimental work . . . fortifying beverages with Vitamin B_{12} is now being carried on. Vitamin-fortified carbonated beverages may be *your* next sales success. Contact Pfizer for information accumulated in more than 17 years as a leading vitamin manufacturer.

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630 Flushing Ave., Brooklyn 6, N. Y.

Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.

Manufacturing Chemists for Over 100 Years

Pfizer

Whenever you have a food processing problem, talk it over with your Pfizer sales representative. He'll be glad to assist you.

since 1920 / Glycerine is the Humectant

For over 30 years, "Fireside Kreamy Whip Marshmallows" have contained U. S. P. Glycerine. The Fireside Marshmallow Co. of Chicago uses Glycerine primarily because it preserves tenderness in cast marshmallows—keeps them fresh by retaining moisture.

A conditioning agent used for foods, chewing gum, dentifrices, and pharmaceuticals must be desirable in taste. It also must *not* interfere with or distort other flavor elements. U. S. P. Glycerine fully meets these requirements.

In candies and confections . . . in flavoring preparations . . . in casings for meat and cheese . . . in dozens of other food applications—Glycerine's unique range of properties and freedom from toxicity make it an outstanding favorite.

NEW FREE BOOKLET ON PRODUCT CONDITIONING contains text, tables, and graphs on how to choose a product-conditioning agent; performance versus cost of conditioners; Glycerine properties, derivatives, grades, and specifications. For your copy write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

Nothing takes the place of Glycerine

Ascorbic Acid

—Continued from page 82

retain moisture in the cooked product and to provide for less critical processing operation.[36]

Other phosphates also are claimed to reduce shrinkage, yield smaller moisture losses in cooking or smoking, improve color and speed processing. Sodium ascorbate, in combination with these compounds, may make an overall improvement in the products.

According to Tressler, beef, pork, sausage, hams, and bacon have been improved in flavor and texture by adding monosodium glutamate.[37] Ascorbic acid or sodium ascorbate are stable in aqueous solution in the presence of MSG. It may, therefore, be of interest also to evaluate the combined value of these two substances in meat products.

While liquid smokes or artificial smoke flavors may not at present be used in sliced meat products, etc., to be sold in interstate commerce, it is interesting to note that when tested in frozen ground pork with added ascorbic acid, the combination functioned synergistically, thus improving the meat product.[38]

Limitations

Ascorbic acid is not a panacea for all the color and flavor problems of the packer. It has the following limitations which must be recognized:

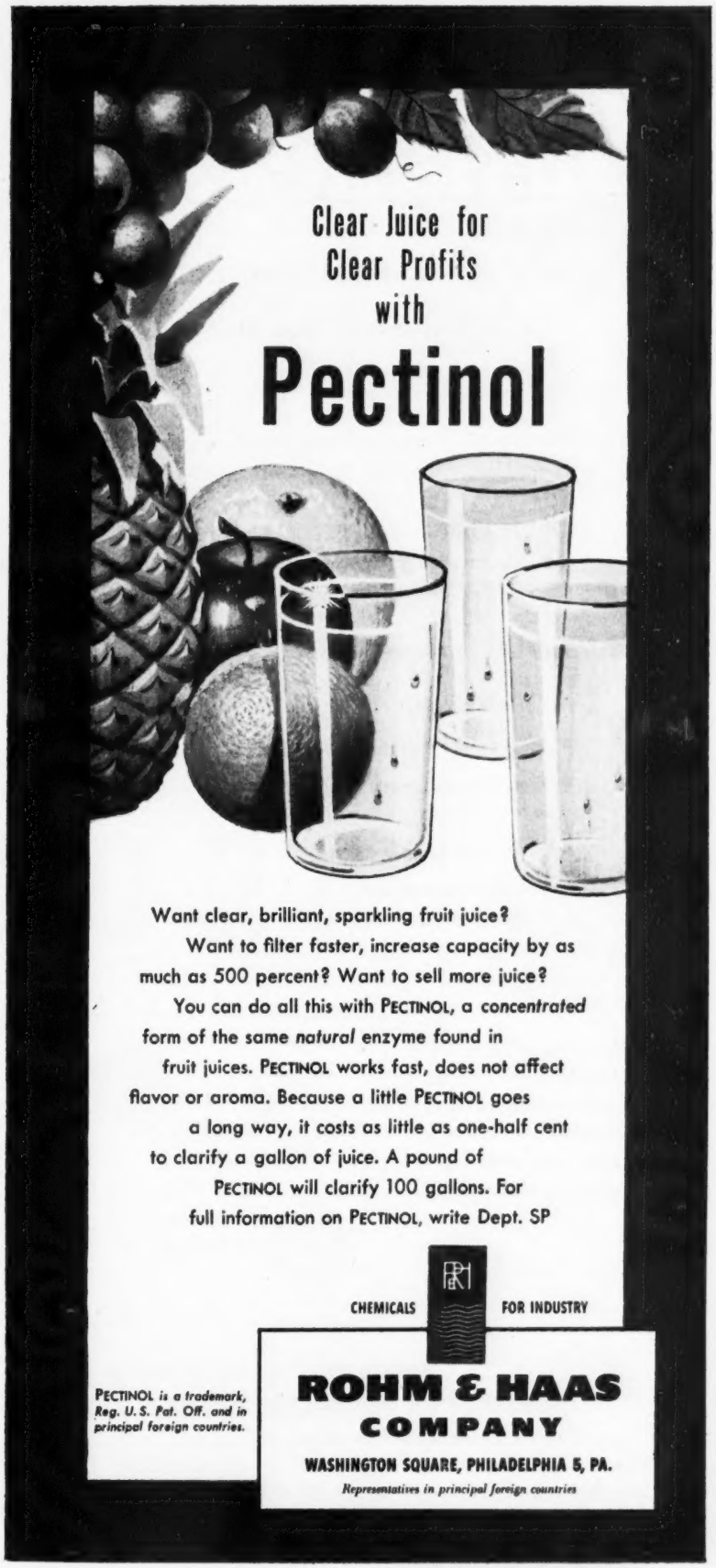
1. It will not deepen the color of a cured meat product beyond the potential of the particular meat used. The degree of color which can be obtained is limited by the amount of myoglobin or myoglobin and hemoglobin pigment present in the meat.[39]

2. It is not a preservative against growth of bacteria and fungi and will not prevent spoilage from improper processing or storage.

3. It will not mask either poor ingredients, such as rancid or incipiently rancid fat, or poor plant practice.

4. There is no single method of applying the material to every plant and every product. Varying conditions and raw materials in each plant make it necessary that the general procedures be adapted by the individual packer to the needs of his plant.

When plant tests are planned it is suggested that three to five trials be run several days or a week apart. In these trials a single source of meat chop or emulsion should be divided equally into two parts, one part of which will be the control or regular process and the second part to be treated with added ascorbic acid. In all instances where both products are passed through the same equipment,


Clear Juice for
Clear Profits
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Pectinol
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the regular sample should precede the treated sample.

Where no plant-trial experience exists, the legal quantities of ascorbic acid or sodium ascorbate should be tried. With experience, it may be possible to use somewhat less than the maximum amounts permitted.

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End (Resume reading on page 83)

Low Calorie Ingredients

—Continued from page 90

division, and the fact that Sucaryl does not compete economically with sugar and, therefore, cannot be used as an adulterant to cheapen manufacturing costs of standard foods and beverages.

If artificial sweeteners are promoted for use by the people for whom they are intended, it is felt that most states will come to permit their use.

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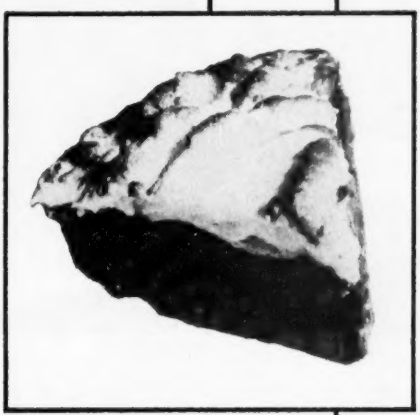

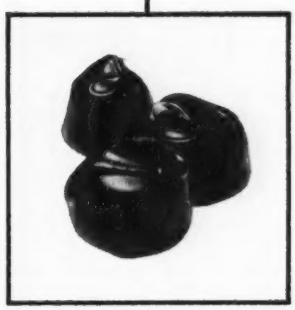

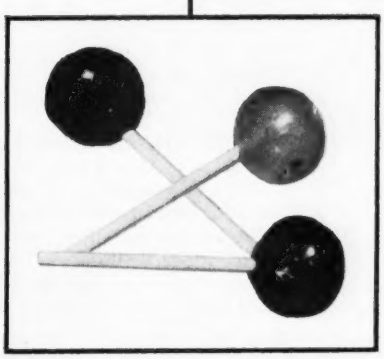

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Mr. Patten is the distinguished protein chemist who first worked out the highly complex procedure for making MSG on a commercial scale in this country. If there's ever a Hall of Fame for the food industries, we think you'll agree Mr. Patten deserves a niche there.

A third thing, though, we can't *show* here. That's Huron's wealth of technical experience. Through the years we've built up a technical service group second to none. Having longer experience than any other manufacturer of MSG, we've amassed a vast fund of technical data on its use. The answers to most of the questions processors want to know are in our files right now.

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That the market for dietetic products using synthetic sweetening agents is growing, both in volume and variety, is highly evident. There is an extensive need for these products. There is a consumer interest in them. Manufacturing problems can be solved by using special bulking and bodying agents where they are required. Properly promoted, the dietetic products can form a permanent plus-market for the food processor.

As has been pointed out, sugar is a food as well as a sweetening agent, while the artificial sweeteners provide only sweetness and have no food value. They are intended only for those who must control their intake of sugar. The two products are for different purposes and people.

The dietetic food consumer realizes all this, which is why this is a plus-market appealing to people who have never purchased much sugar sweetened material.

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End (Resume reading on page 93)

True Fruit Flavors

—Continued from page 97)

3. Where high strength and low cost are imperative, as for instance in hard candy. Here, moisture and alcohol content of true fruit flavors also is undesirable.

4. Where bitter or unpleasant preparations have to be masked by extremely powerful flavors, as in case of medicinals.

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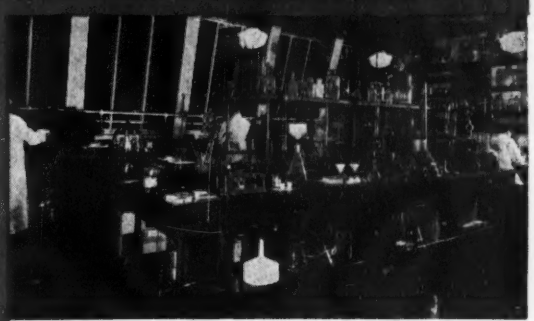

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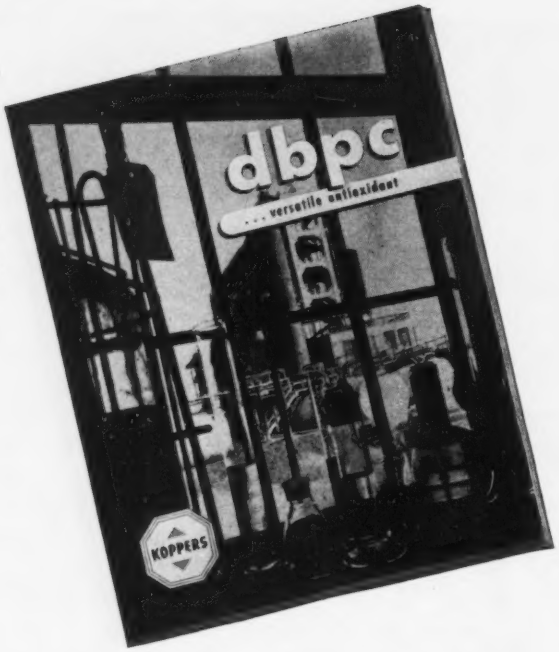

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combination of both imitation and true fruit flavors may be indicated. However, it is obvious that a boosting of true fruit flavors with imitations has to be done judiciously—for if the latter completely overpowers the natural taste, one might as well use imitation.

Table II indicates flavors that may be used to advantage for the various foods, beverages, and allied products.

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End (Resume reading on page 99)

Tailored Salt

—Continued from page 79

crease or decrease the hygroscopic quality of the salt—its ability to absorb or not absorb water vapor. For example a hygroscopic product is added to make salt adhere to casings in curing. A material to decrease hygroscopicity, however, is built-into salt that is employed in the manufacture of dry cake mixes.

An excellent example of enhancing the natural seasoning aspect is the recently developed tablet that incorporates monosodium glutamate (MSG). Other possibilities in this direction—using salt as a carrying vehicle for some of the small quantity flavors—appear equally promising.

There has been much success recently in building-in additives that produce more desirable quality in the seasoned product.

For example, it has been found that small quantities of calcium sulfate or calcium chloride act to produce a firm-

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ing effect in canned whole products such as tomatoes or potatoes. These now are added as integral parts of the regular salt or salt tablet.

Color improvement in canned foods is another gain, fostered by the incorporation of ascorbic acid in salt tablets.

Still another approach is inclusion of elements to combat adverse action due to the salt itself. Thus an antioxidant is built-into "RG" salt to combat a tendency of the natural ingredient to encourage oxidative rancidification in products processed in fats.

Finally there is the wide and challenging path open to tailoring salts to combat many of the subtle difficulties due to chemical balances in processes.

In this category is a recently developed anti-struvite salt. It includes sodium hexametaphosphate. The product thus provides normal seasoning and at the same time prevents formation of struvite crystals in canned fish.

It is also expected that other minutely included chemical constituents will act to combat many offensive or undesirable developments in canned and preserved foods by inhibiting or retarding the factors that cause them.

End (Resume reading on page 80)

Antioxidant Uses

—*Continued from page 75*

tion of antioxidants to herrings in cold storage was without significant effect.[31]

Incorporation of antioxidants in the wrappers of pork products such as bacon is one possible solution to the problem of bacon rancidity. However, recent studies of the effect of dipping bacon sides in lard containing BHA have shown only small increases in stability.[32] In contrast, synergized BHA used in the preparation of frozen creamed turkey greatly influenced the fat stability and flavor as shown in Table VI.

Other Foods

Even though confectioners have a wide choice of saturated fat available as ingredients, storage life of many candies is limited by fat oxidation. Storage life of cream fondant with 5% butter has been increased over three times by using 0.01% BHA, NDGA, or BHA-propyl gallate-citric acid mixture.[33]

Use of ascorbic acid in prevention of oxidative color and flavor changes in non-fat foods, or in the non-fat portion of foods, is being extended to many products. It is being employed to prevent oxidative color changes in fresh and cured meats, and its addition to mushrooms as an optional ingredi-

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ent is allowed under the new Standards of Identity.

That color and flavor of mushrooms can be improved by addition of the allowable amount of ascorbic acid is shown in Table VII. Like fat antioxidants, uses of ascorbic acid in processed foods are sure to become more extensive in the near future.

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End (Resume reading on page 76)

Chemicals in Foods

—Continued from page 72

sive dosage in animals be regarded as a presumption of harmfulness in man?

3. Is harmfulness to be defined on a *per se* basis or with due regard to level and manner of use in foods?

4. Is a substance which is "not harmless" equivalent to a "poisonous or deleterious substance"?

5. If so, wouldn't the public health be protected by establishing tolerance limits for food colors whose only known adverse effect arises from intakes well above practical levels?

The question—whether a coal-tar color deemed unsuitable for use in foods should also be barred from drug or cosmetic use—is the subject of heated controversy. But it is outside the scope of this report.

Widespread publicity given in recent years to overweight as a contributory factor in mortality due to cardiac failure has resulted in enormously increased use of artificial sweeteners. Interest of FDA in this field was manifested several years ago by the rulings that two of these substances—dulcin and P-4000—are poisons and have no place in foods. Newest member of the artificial sweetener family in sodium cyclohexylsulfanate (Sucaryl sodium) and the corresponding calcium salt developed for use in low-sodium foods.

Though these, like saccharine, have the blessing of FDA, some concern is felt for the desirability from the standpoint of nutritional policy of encouraging the manufacture and sale of low-energy food packs.

It is interesting to note that 10 million cases of canned dietetic foods were packed in 1953, a 100% increase over the 1951 pack.

Commissioner Crawford has enlisted the aid of the Food & Nutrition Board of the National Research Council in formulating a guiding policy with respect to the control of artificially sweetened foods. To this end the Subcommittee on Toxicology has undertaken to review the available literature on the toxicity not only on saccharin and Sucaryl, but of the thickening agents used with them.

In this connection, reference also may be made to the effort of the Food Protection Committee of the National Research Council to evaluate the actual extent of use of intentional chemical additives in foods.

Statements made at the Delaney Committee hearings have given what many believe to be an exaggerated idea of the "chemicalization of the food supply" and of the jeopardy to which public health has been exposed by reason of the vast numbers of "untested" chemicals in use. To get at the facts, the Subcommittee on Food Technology has been conducting an extensive survey of the food industry through individual companies as well as trade associations, a preliminary report of which is now being drafted.

It has been predicted by many observers of the Congressional scene that no new legislation dealing with intentional additives to foods can be expected this year. However, possibility of enactment of a pesticides bill (the Miller Bill H. R. 4277) appears to be favorable since it has already passed the House with support of FDA.

Principal food additives bills in the legislative hopper are the Delaney Bill (H. R. 2245), the Miller Bill (H. R. 4901), and the O'Hara Bill (H. R. 8418). The first two have been discussed elsewhere.* The last was introduced on Mar. 16, 1954. Fostered by a group of food industry associations in the Midwest, it is said to have the unofficial, but none-the-less vigorous, opposition of FDA. Continued efforts are under way with a view toward developing a formula acceptable to both the chemical and food industries as well as to FDA.

* Oser, B. L., "Status of Proposed Amendments Affecting Chemical Additives." *Food Technology*, 7, 341, 1953.

End (Resume reading on page 73)

Vitamin A-Roche'
in batch size cans
or in bulk for
food mfrs. —

Bill:

Did you see this? Why can't we use it?

Jack

P.S. See the other side.

You can have the acetate in potencies up to 300,000 units per gram in edible oil, in sanitary tin cans of various sizes for batch mixing -- or in large, specially-developed bulk packings up to 50 kilos. The palmitate is similarly available, and in potencies of 500,000 to 1 million units per gram.

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Bill:
See the other
side after
you read
this.
Jack

Dry Solubles

—Continued from page 84

An effective seasoning is consistent in characteristics and level from lot to lot, properly balanced, stable, free from off notes, and sufficiently concentrated to provide a full, fine flavor in the finished product.

These requirements can be met only by maintaining the most rigid control over the raw materials used in the manufacture. This implies extensive and continuous laboratory evaluation as well as careful processing control.

As the characteristics of natural plant materials vary considerably, so also do the essential oils and oleoresins prepared from them. Only by considering many lots of a given oil, selecting the most desirable, and blending over long periods of time, can one guarantee both high quality and minimum variation.

This may appear relatively simple. In practice, however, it becomes quite complex. For example, in preparing a soluble black pepper, one finds that oleoresins are available, or can be prepared, from mixed Malabar, Telicherry, Aleppy, Lampong, Sarawak, Singapore, or several other varieties of berries, each of which is quite different in characteristics. Then on examining three lots of oleoresin from Lampong pepper we find that they vary radically in bite, odor, chemical and physical properties, and even in appearance.

To complicate matters further, the soluble supplier finds that each customer has a different conception of what the "true" flavor of pepper is.

Special Packaging Needed

Correct packaging of dry soluble seasonings has become a major project. A shipping container must act as an effective moisture, vapor, and bacteria barrier, must be sufficiently tear-resistant to prevent breakage under the worst shipping conditions, and still must present an attractive appearance.

Lined fiber drums have been found most useful, the type of lining depending on the seasoning. Loose polyethylene bag liners are quite versatile, although coating the interior of the drum with polyethylene latex has been found more effective and economical. Unfortunately, polyethylene is vulnerable to many flavor concentrates and products such as paraffin, microcrystalline wax, saran film, synthetic rubber latex, and other films, must be used for specific problems.

Packaging in batch increments has become a popular service to the food processor. The seasoning is bagged according to weights as specified by the customer, and the bags are packed in fiber drums for shipping. Advantages include labor saving to the user, more accurate quantity control (many suppliers use automatic weighing equipment capable of maintaining tolerances of $\frac{1}{8}$ oz. at $2\frac{1}{2}$ lb.) and added protection of the bag promote longer storage life.

Here again the bag material must be chosen specifically for the product. Materials commonly used are kraft paper with glassine or cellophane liners, polyethylene, rubber hydrochlorides, and other polymeric films.

Storage and Handling

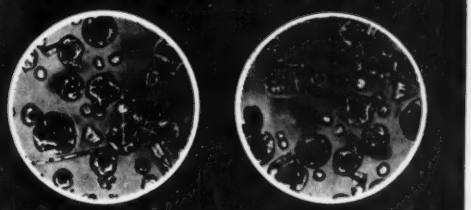
All flavor materials require careful storage under controlled conditions, and each discussed poses its own problems.

Dry solubles have a tendency to be hygroscopic, and to lose flavor if stored in open containers or in an excessively hot room.

P&S

POLVAROMAS

the PERFECT ANSWER to POWDERED FLAVORS



As illustrated in the above photomicrographs, Polvaromas are made through a special P & S process whereby a drop of flavor is entirely surrounded by a protective coating of edible, non-toxic vegetable material. With Polvaromas the flavor is not dried on the surface of a powder, but is locked within. This is proof of your gaining optimum flavor stability.

Here at last is the perfect flavor solution for all food products which are based on a dry composition.

Polvaromas are available in all popular flavors. We shall be happy to submit samples and further technical information for your approval.

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- ☐ Custardizing milk & products containing milk solids
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*SeaKem is the trademark for the standardized, water-soluble, sea plant extractives manufactured by the Seaplant Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for use in an unusually wide range of food applications (see lists above), SeaKem Products have won acceptance on the basis of proven advantages with leading manufacturers and processors.

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Natural spices mold easily, develop higher than normal bacteria counts, and frequently become insect infested.

Most essential oils and oleoresins, if stored in air-tight brown bottles, have almost unlimited life, but breakage can be very costly. Temperature control is extremely important in storage of any flavor.

Perhaps the most recurrent question regarding dry solubles is, "How do I label my finished product?" We feel it imperative to refer the user to several sources for an authoritative answer to cover any specific instance, namely: (1) Federal Pure Food & Drug Act, *Service & Regulatory Announcements;* (2) Regulations of the Meat Inspection Division of USDA, and (3) Laws of the state and municipal areas in which the processor distributes his product.

A few generalities to cover certain uncomplicated cases are:

1. If the dry soluble seasoning is prepared only from a carrier accepted as a normal component of the finished product, and from unmodified oils or oleoresins distilled or extracted from natural plant material, the label may read "Flavoring Added," or such other option as the regulations may permit.

2. If the dry soluble contains synthetics or isolates, the label will read "Artificial Flavor Added", or a permitted option.

3. If the dry soluble contains some natural ground spice the label may read "Spices and Flavoring Added."

4. If the dry soluble contains dehydrated onion or garlic, the label may read "garlic added", or "onion added", as the case may be.

5. The carrier may influence predominance of ingredients in the statement.

6. If the dry soluble contains monosodium glutamate, hydrolized vegetable protein, curing agents, ascorbic acid, or dehydrated vegetables, the items will be reflected individually on the statement.

These generalizations emphasize the obligation of the seasoning supplier to label his product properly and honestly. FDA requires that containers of seasonings bear a statement of ingredients in order of predominance. The Meat Inspection Division further requires that each container within a shipping container bear such a statement.

For the protection of the customer, it is necessary that these statements be complete and correct, indicate any imitation flavors, all components of the carrier, all adjuncts and any "flow-free" agents. Neglect in so doing can have disastrous results, as illustrated by the processor who, unknowingly, added a seasoning containing starch as a flow-free agent to an all-meat product. Of course, an iodine test of the finished meat indicated the presence of flour.

The dry soluble seasoning field has grown out of the food industry's need for specialized flavor products. Characteristics of the seasonings reflect their custom preparation in many ways. Since most food products require a minimum of 0.5% of total weight to be flavored in order to insure good distribution with normal mixing, seasoning manufacturers usually adjust the concentration of the dry soluble such that 8-oz. will flavor 100 lb. of product.

However, almost any proportion from 4 oz. to 10 lb. per 100 lb. of product can be supplied as dictated by the customer's process.

Addition of special adjuncts as needed and when chemically compatible with the flavor is another common service. These may include curing agents, ascorbic acid, citric acid, phosphates, yeast, dehydrated vegetables, binders, pectins, and many other approved food ingredients.

Versatility of this type of seasoning has led to its use in almost every branch of food manufacture, and every processor of flavored foods may well consider his flavor problems with a view to the advantages accorded by dry solubles.

End (*Resume reading on page 85*)

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FINANCIAL AID TO HIGHER EDUCATION

What Business Can Do to Help Our Colleges and Universities

Is the financial squeeze now gripping our colleges and universities grave enough to warrant direct action by the business community? If so, what can business do about it? This editorial is addressed to these two questions.

In the previous editorial in this series of two, it was demonstrated that **our colleges and universities, and particularly the independent institutions, face financial difficulties, which, unless relieved, promise to get progressively worse and might ultimately result in a national disaster.** This state of affairs obviously gives the business community a crucial stake in helping to relieve the plight of these institutions. For our business organizations can be no stronger than the total community of which they are a part.

It does not follow automatically, however, that every business firm should give direct financial aid to education. Already the business structure is heavily burdened with activities unrelated to its main purpose. These include acting as tax collector for more than $65 billion of federal, state and local taxes in the year 1953. There is a limit to the amount of such public enterprise that can be loaded on the business system.

Business Holds Key to Answer

If, however, the survival of a key part of our educational system depends on its having financial help from the business community, that help should be provided. And this is the situation of our independent privately endowed colleges and universities.

Of course, our tax-supported institutions of higher learning must also be kept strong, financially and otherwise. But they have recourse to public support not available to the independent institutions. Largely on this account, their present financial difficulties are much less acute than those of the independent colleges and universities.

These independent institutions have seen price inflation eat away much of the value of their endowments. Moreover, there is no prospect that these endowments can be sufficiently replenished by gifts from the wealthy people who provided them in earlier years. Progressive income and estate taxes have seen to that. Thus, they are faced not only with a peculiarly acute financial problem, but also one which cannot be solved except by tapping other sources of aid.

Tax Support No Solution

It is conceivable that the independent colleges and universities might solve their financial problem by seeking support from tax revenues. If they did this, however, they would lose their distinctive character as independent institutions, and our system of higher education would lose one of its major elements of strength. That is the existence in our educational system of both independently financed and tax-supported colleges and universities. Each has its special contribution to make to a well-balanced system of higher education.

Business is directly dependent upon higher education to staff its increasingly complex and exacting operations. A key part in this process is played by the small, independent liberal arts colleges which are the hardest hit financially of all our institutions of higher learning. "These," states the Council for Financial Aid to Education, recently formed by a group of business leaders, "have contributed a high proportion of the intellectual, scientific and religious, as well as business leadership of the nation. Their programs are devoted to the teaching of values, particularly the values of freedom. They are a vital bulwark to our system of free enterprise."

Means of Providing Help

There are many means by which business firms can extend help to our colleges and universities. The most obvious, of course, is to make outright grants of money either to individual institutions or to groups of institutions for such uses as the institutions think best. Another means of help, increasingly employed by business firms, is to establish scholarships to pay the full cost of college or university courses of study. Sometimes the scholarships are open for general competition, sometimes they are limited to employees and children of employees of the firm granting them. Not infrequently those winning the scholarships spend some part of their school vacations working in the companies granting the scholarships.

A number of companies have recently provided for what have come to be called "scholarships in reverse." These companies pay a flat sum to a college or university for every one of its graduates they employ. Financing of university research programs also offers a broad avenue for financial aid to our universities by business.

Need Two-Way Communication

Some business firms have well-developed programs for financial aid to education. But they are exceptional. For most companies the problems involved are new and strange. These companies were created with the basic purpose to make money, not to give it away. Successful philanthopic operations involve a whole set of problems with which they have very little experience. Not the least of these is how to make business a dependable source of financial aid to education, since business has no assurance that the profits of one year will not be losses the next.

Considerations such as these emphasize the wisdom of a recent Industry-College Conference on aid to higher education by business, in making the first of its ten conclusions that "better communication, by direct contact, is needed for each [industry and the colleges] to understand the problems of the other." At this juncture the creation of mutual understanding is much more important than the raising of some money and letting it go at that. The problem of aid to education by business has its immediate urgency, but there is also a long-range program to be developed on which business and the colleges and universities must pull together in the years ahead to find a satisfactory solution.

As stated at the outset, failure to find a satisfactory solution could result in a national disaster. This means that, **to give proper heed to their own future prosperity and the future welfare of the nation, business firms generally must go to work on the problem of financial aid to higher education. They must go to work first, to understand the problem; second, to establish two-way communication with our colleges and universities about it; and third, to develop a program which pays proper heed to the needs and capabilities of both business and higher education.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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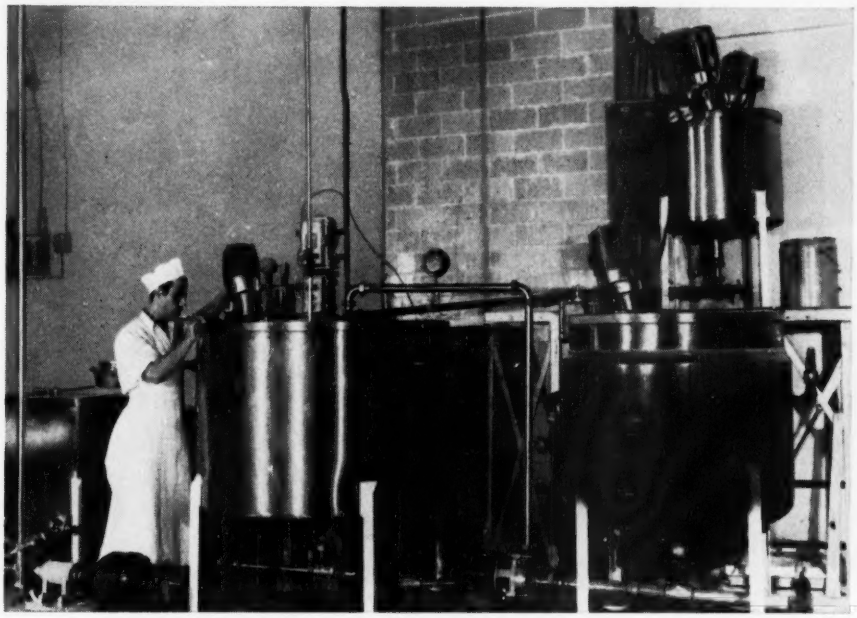

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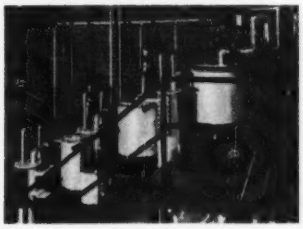

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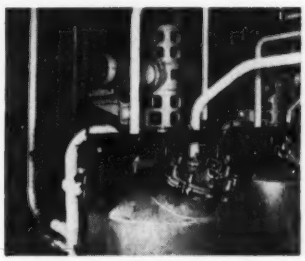

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1 **INCOMING** grains arrive in bulk, are quality checked and moved via pneumatic system to hopper above silos.

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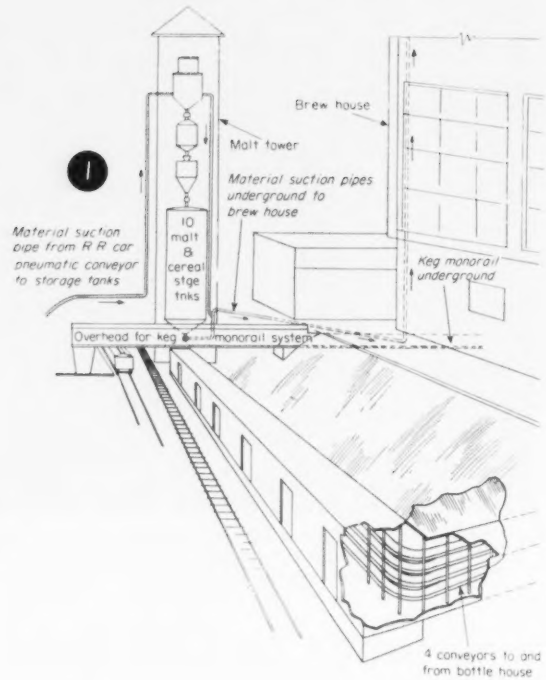

Brew house
Malt tower
1
Material suction pipes underground to brew house
Material suction pipe from R R car pneumatic conveyor to storage tanks
10 malt & cereal stge tnks
Keg monorail underground
Overhead for keg monorail system
4 conveyors to and from bottle house

Newest Streamlined Brewery

It's highly mechanized, efficiently coordinated. Materials of construction are selected to provide maximum sanitation and product quality protection

MODERN mechanized, highly sanitary, and efficiently integrated materials-flow equipment marks operations at Olympia (Wash.) Brewing Co.

Incoming grains–malt, corn, and rice–are moved pneumatically from rail cars to a collector atop storage silos. A screw conveyor distributes them to any one of ten bins.

A second pneumatic (vacuum) system carries grains from storage to top of brewhouse. Here–Point (2) in accompanying flowsheet–malts are blended, ground, and chuted in weighed amounts to cooker. Cereals–grits and rice–are chuted to cereal cooker. Ingredients then are "mashed" in their respective units–the infusion method.

Boiling cereal mash, temperature 212 deg. F., next is pumped to the malt cooker. The latter is equipped with two steam jackets–upper and lower. Lower is used in heat-

FOR STORY behind the Olympia lines: See p. 60.

malt, with upper section brought into play upon addition of boiling cereal. Combined mash is heated to 160 F.

Rate of rise of malt mash is of prime importance. Constant 160 F. is maintained until all traces of starch disappear before increasing temperature to 172 F. At this higher heat the enzyme becomes inhibited and so the dextrin-to-sugar ratio remains stable.

It then is pumped to lauter tub (3)–a shallow, large dia. tank with a double bottom. This tub is equipped with a motor driven center shaft that rotates lautering rakes slowly to maintain a uniform loose filter bed of grain.

After a slight rest period, draw-off cocks are opened, permitting wort to run through this filtering medium into the grant–a small collecting tank–below. Wort is recirculated for about 20 min. via pump from tub to grant, until it become brilliant. Then it is pumped to brew kettle.

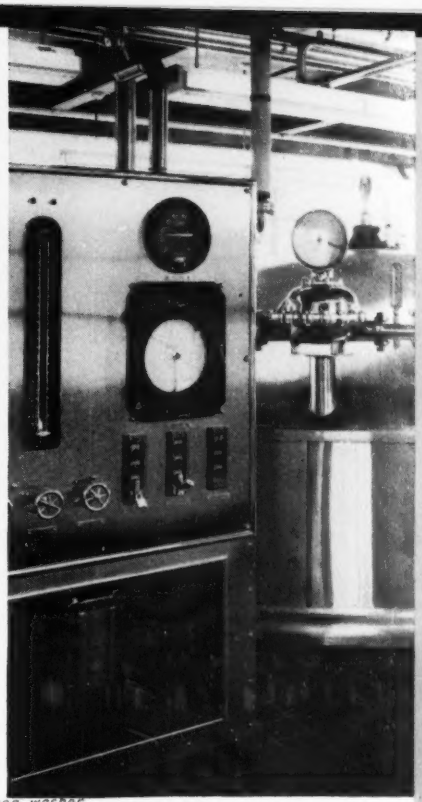
Spent grains in tub are sparged with a metered amount of 173 F. water to extract residual sugars and soluble proteins. They finally are dropped from tub to trucks and sold as stock feed.

Wort in brew kettle is heated as it percolates through tubes of steam chest located in center of kettle near bottom. Heating and filling are regulated so that wort is brought to boil just as kettle is filled. Boiling continues for 90 min. Hops are added during boiling.

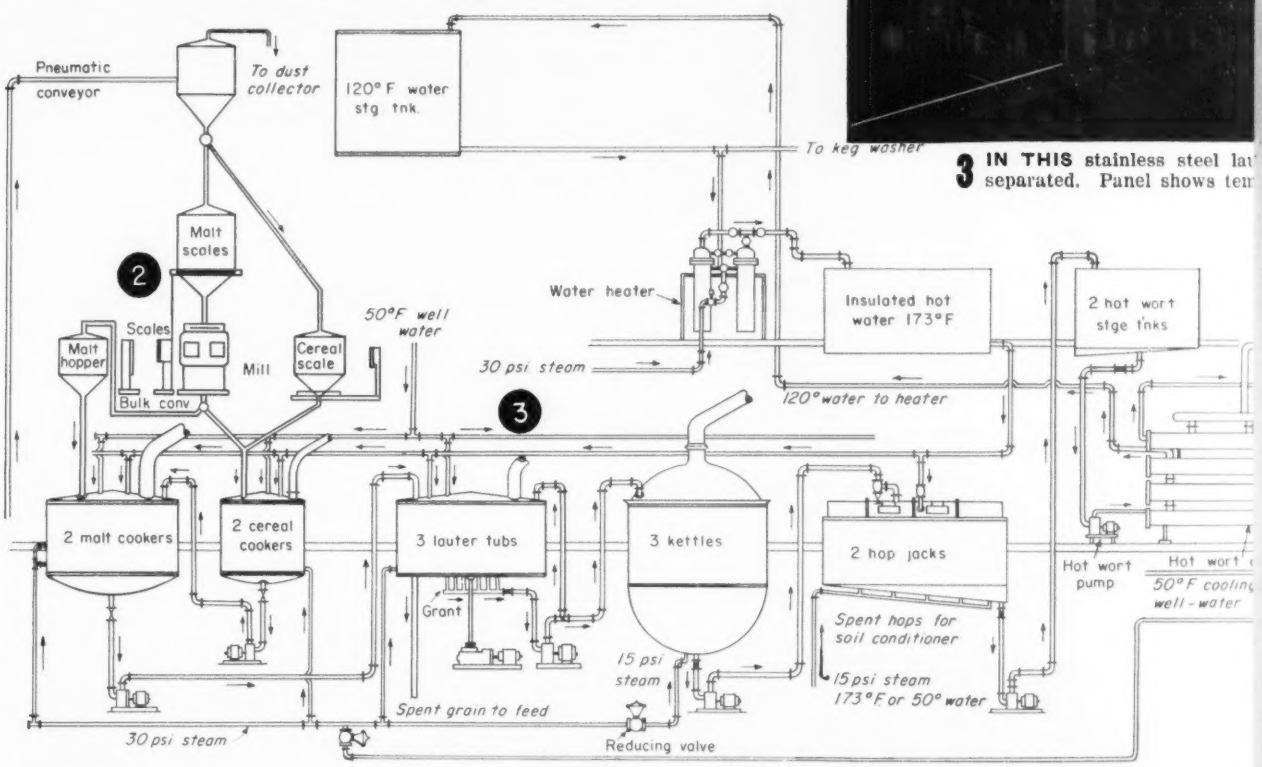
Wort passes from kettle to hops jack–a stainless steel rectangular tank, with perforated false bottom, which retains hops and through which wort filters. Wort is pumped from jack to work storage tanks. Subsequently it passes through a shell-and-tube cooler, where temperature is reduced from near boiling to 45 F. Cooled wort next goes to rectangular starting tanks with liquid yeast forced into the infeed line. Fermentation is in three stages: Starters, primary, and secondary fermenters.

From starting tanks, wort travels to primary fermenter–enclosed rectangular flat-bottom tanks housed in a refrigerated building. Here, 85 to 90% of entire fermentation occurs. Move then is to secondary fermenter, held at tem-

2 **OPERATOR** is seen setting code system on scale printing device to record grain ingredients used in each batch. Malt mills are in background.



3 **IN THIS** stainless steel lau separated. Panel shows ten

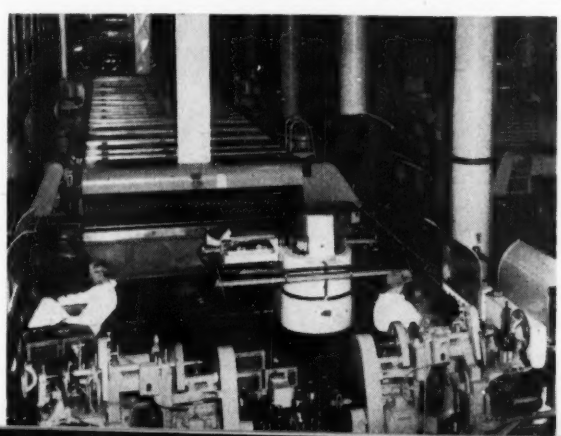


perature of 32 to 34 F. for period of 6 to 7 days. Here fermentation is completed. Beer then is filtered (5) through diatomaceous earth before entering the "ruh" stage or aging tanks. Aged beer is carbonated naturally in the Kraeusen tanks, from where it is passed through a cooler, once again polish-filtered then delivered to standardization tanks. Finished beer now is pumped and metered to racker to be filled into kegs, or to tanks supplying bottle and can lines.

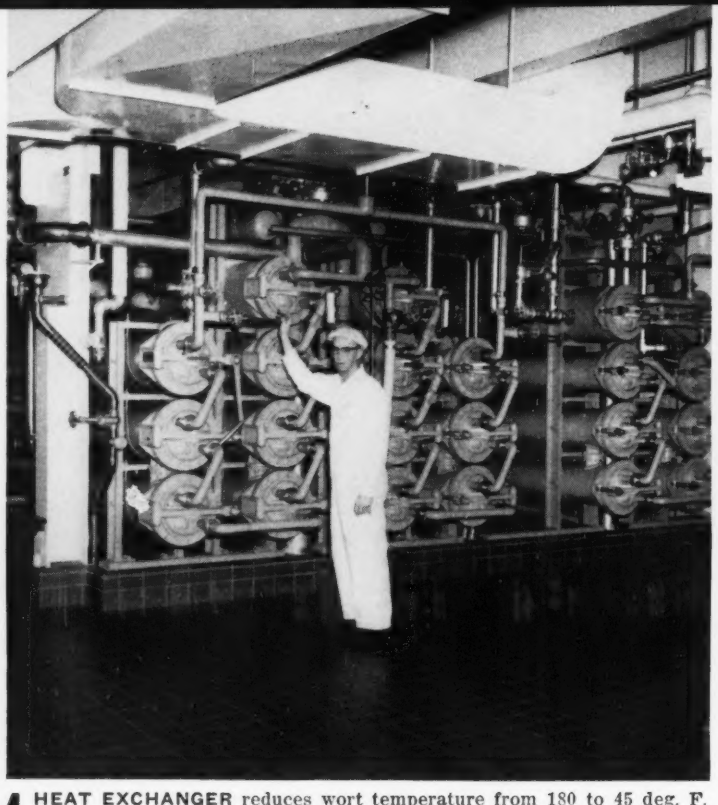
Filled kegs travel via monorail from racker to loading dock. Empty bottles are washed, rinsed, inspected, filled, and capped. Bottled beer is pasteurized, inspected, labeled, automatically cased, then travels by belt conveyor to rail and highway shipping dock. Monorail also moves empty kegs from rail siding to brewhouse.

Cases of empty, lithographed cans are unloaded manually from rail cars, conveyed to rinser, then filled, closed, pasteurized, automatically cased, and go to truck and rail loading docks.

7 **INSPECTORS** on line visually examine filled bottles of beer coming from pasteurizers on single-file conveyors.

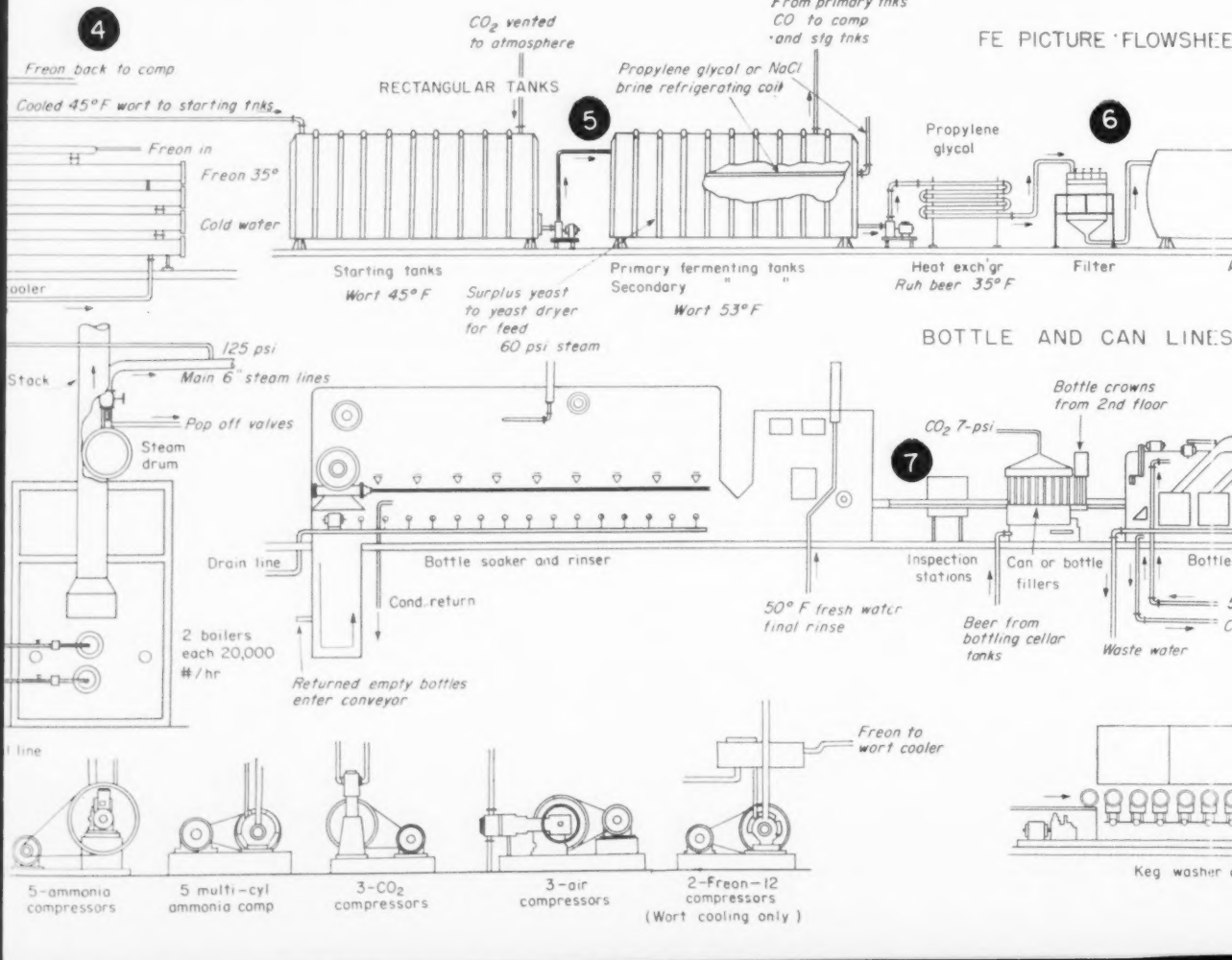


ter tub, grains and wort are
peratures, rake position.

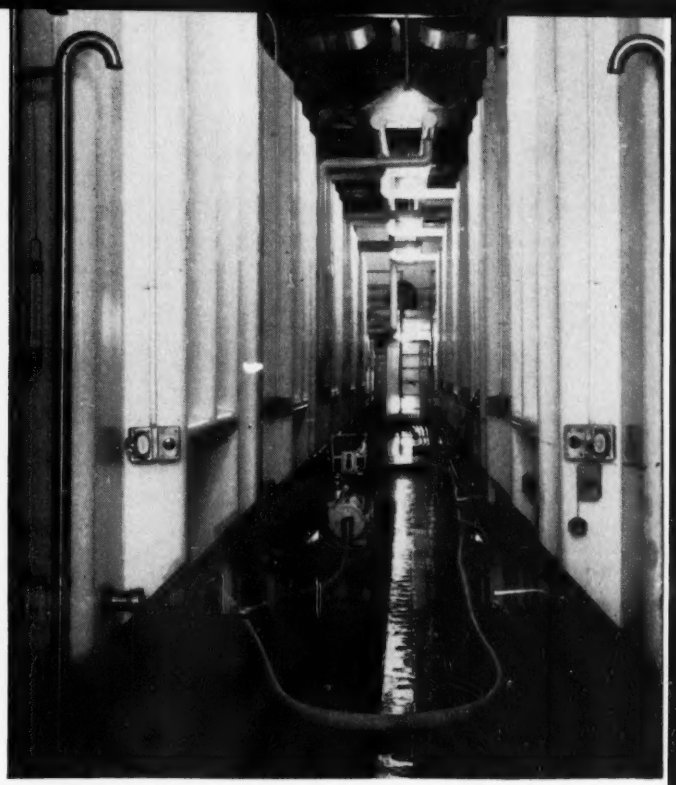


4 **HEAT EXCHANGER** reduces wort temperature from 180 to 45 deg. F. at rate of 200 bbl. per hr. Recording temperature controller regulates run.

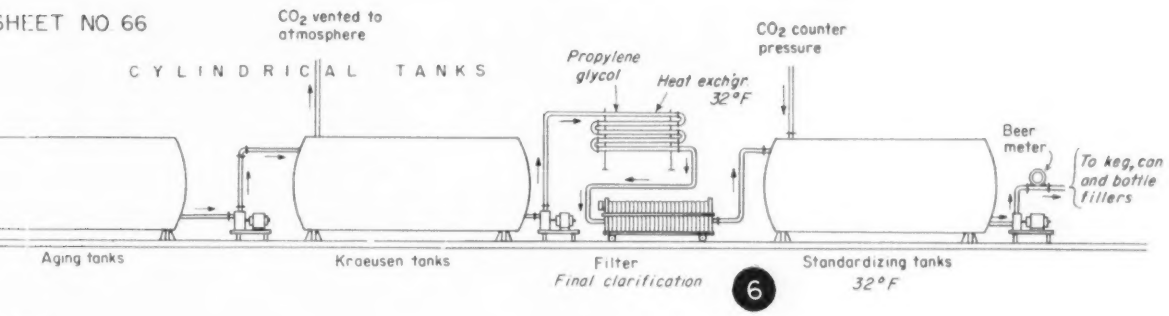
5 **TWO TYPES** of units (foreground

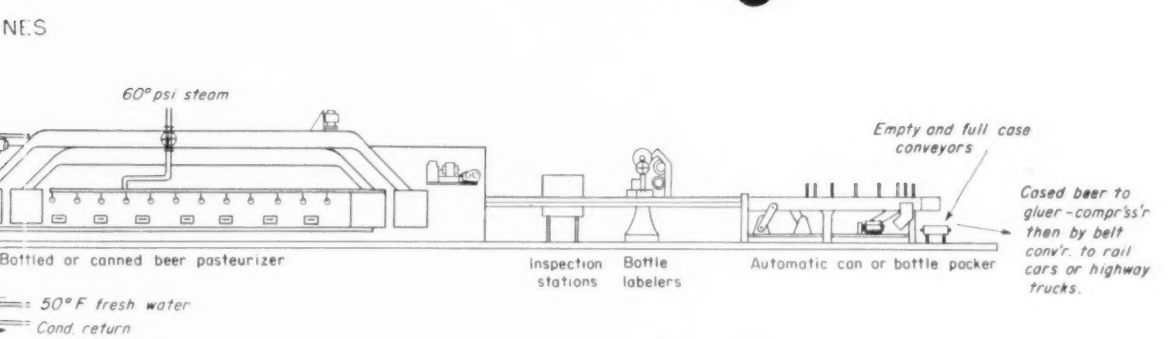


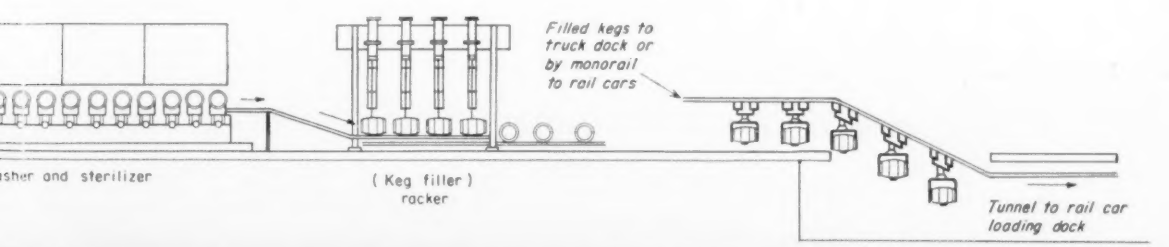
S of filters—diatomaceous earth (left) and plate-and-frame round and right)—are employed in brewing operations.



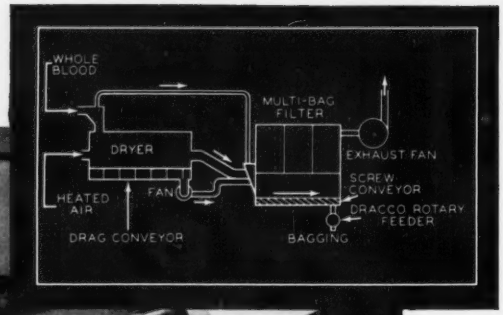
6 **CORRIDOR** view of rectangular fermenting tanks. Shape saves space. Tanks are housed in refrigerated building.

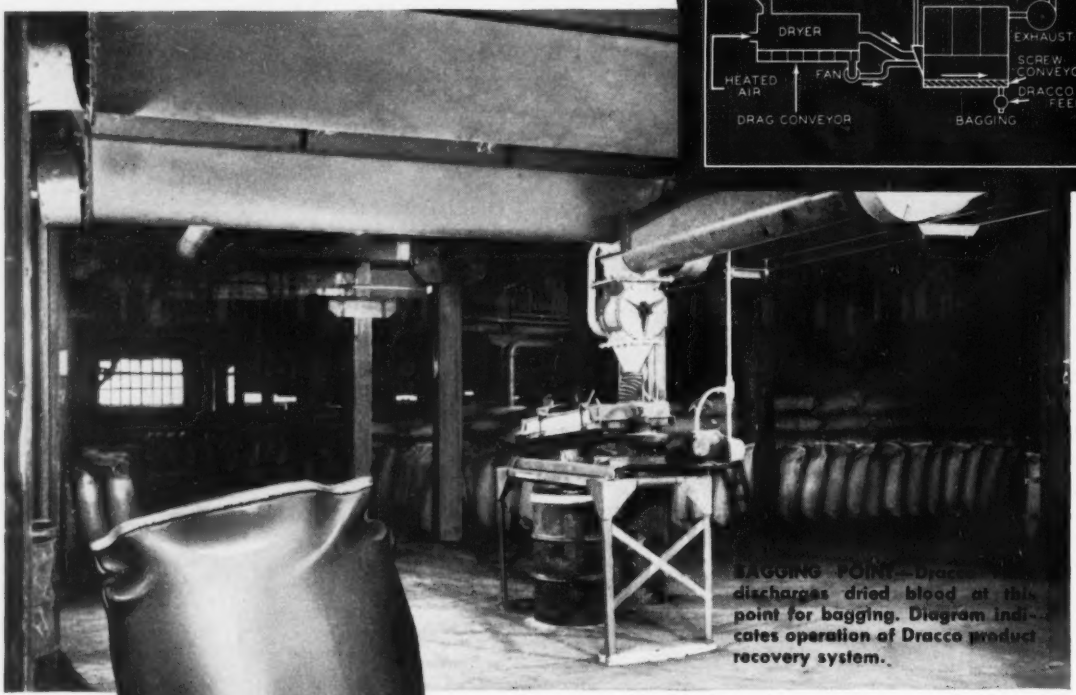



NES
60° psi steam
Empty and full case conveyors
Cased beer to gluer - compr'ss'r then by belt conv'r. to rail cars or highway trucks.
Bottled or canned beer pasteurizer
Inspection stations
Bottle labelers
Automatic can or bottle packer
50°F fresh water
Cond. return


Filled kegs to truck dock or by monorail to rail cars
sher and sterilizer
(Keg filler)
racker
Tunnel to rail car loading dock

AT ARMOUR AND COMPANY, IT'S...





BAGGING POINT—Dracco discharges dried blood at this point for bagging. Diagram indicates operation of Dracco product recovery system.

...BLOOD BY THE BAGFUL!

Once again Dracco Dust Control Equipment is the heart of one of industry's most unusual production processes.

Dried blood—a valuable ingredient for adhesives—is an important by-product at Armour and Company. So much so, that round-the-clock drying operations are maintained to convert whole blood to blood solids.

Thousands of gallons of blood collected at Armour's meat packing plants are processed and bagged. This blood is fed into a dryer which is uniquely integrated with a Dracco Dust Control System for complete product recovery.

Dried blood solids, removed from the dryer's bottom by drag conveyor, are dropped into a Dracco Fan and blown into the Dracco Filter for collection. To avoid loss of any product, the Dracco System also filters heated air from the dryer and captures all air-entrained blood particles. The result: Armour's blood solids are bagged in a dust-free, efficient operation.

Do you have a new or existing production process which can be made more profitable by peak-efficiency Dracco Dust Control or Recovery? Consult an experience-qualified Dracco Engineer and find out!

DRACCO CORPORATION
4085 East 116th Street • Cleveland 5, Ohio

Dracco Bulletin 800 contains complete information on how to convert your dust *problem* to dust *profits*. Send for your copy today.

DRACCO *Performance Proved*
Airstream **CONVEYORS • DUST CONTROL EQUIPMENT**

2 New Services from Crane

How to Choose the Right Valve for Each Piping Job

HOW TO GET THESE FREE HELPS

Easiest way: phone your local Crane Representative—let him schedule a film showing for your group and supply the "take-home" handbooks. If more convenient, just drop a line to the address below.

Men responsible for specification, operation, and maintenance of industrial piping systems will get a real "refresher" from these new Crane customer services. Both film and handbook deal with the common problems of matching up valve characteristics and specific flow control needs for the most efficient result.

Following a review of basic valve types—gate, globe, angle, and check—variations in design of functional parts, and the effects on serviceability are discussed. All vital elements—disc and seating—disc-stem connection, bonnet joint, stem operation, etc., are covered. The motion picture stimulates high interest by developing a hypothetical case involving strong differences of opinion on valve selection. The manual—intended for distribution at film showings or for independent use—provides a lasting reference.

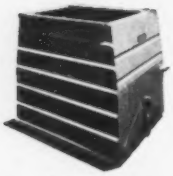
THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

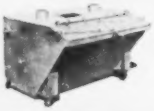
CRANE VALVES

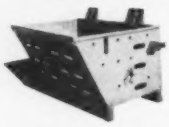
CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

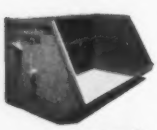
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more information, use coupon on page 181.







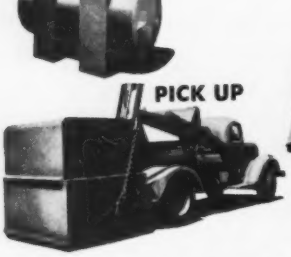


You will Dump High Costs, too..

. . . when you install the Dempster-Dumpster System of Bulk Materials Handling

Manufacturers over the nation have learned to eliminate the costly and inefficient method of handling bulk materials with conventional dump trucks, drivers and loading crews. You can equip one truck with a hydraulically operated Dempster-Dumpster. Then, inside or outside buildings at convenient accumulation points, you simply place detachable Dempster-Dumpster Containers, in capacities up to 4 times that of conventional dump truck bodies, with each designed to suit the materials to be handled—be they solids, liquids or dust . . . hot or cold . . . bulky, light or heavy. Containers shown at left, all handled by one Dempster-Dumpster, are only a few of the many available or that can be built to meet your needs. The Dempster-Dumpster, operated by only one man, the driver, serves scores of containers . . . one after another, as shown below.

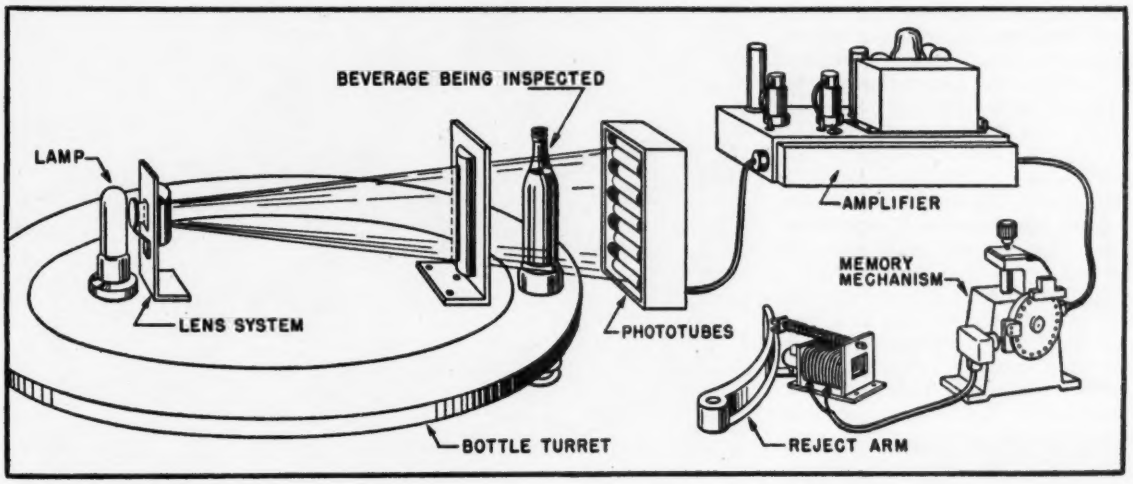
You eliminate trucks standing idle. You eliminate re-handling of materials. You eliminate loading crews. You increase efficiency, sanitation and good plantkeeping with this Dempster-Dumpster System—the lowest cost method of bulk materials handling ever devised. Write to us for complete information. Manufactured exclusively by Dempster Brothers, Inc.



THE DEMPSTER DUMPSTER® SYSTEM

DEMPSTER BROTHERS, 764 Shea Building, Knoxville 17, Tennessee

NEW EQUIPMENT & SUPPLIES



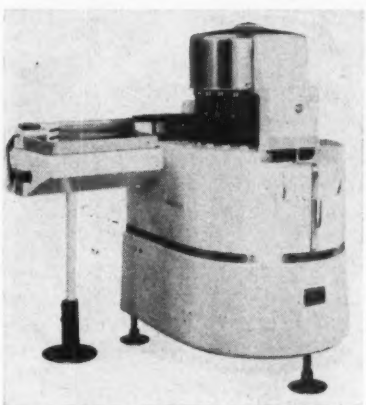
Compact, In-Line Electronic Unit Speedily Inspects Bottled Beer

Electronic inspection of filled bottles of beer at rates of 60 to 150 per, min. is made possible by this compact device.

Heart of the unit is a bank of 10 electronic-eye phototubes which scan contents of bottles as they are conveyed from the pasteurizer to labeler. The device is installed in the line between these two machines. Even minute, transparent bits of foreign matter such as particles of glass or cellophane will cause the phototubes to trigger a circuit controlling a reject arm. When a bottle containing such impurities reaches the outfeed of machine, this arm will divert it to a reject table. Bottles that have passed inspection will be allowed to continue along the conveyor.

To avoid confusion of these particles with blemishes in glass bottles, phototubes are adjusted to react only to pulses of light caused by particles in motion. Bottles are rotated swiftly as they near inspection point, then suddenly stopped while while contents continue to swirl inside them. To allow for differences in thickness of glass and surface contours, a specially designed system of lenses directs the scanning beam through the lower, middle, and upper portions of the bottles to the phototubes. Necks of bottles are masked off from the light so that foam caused by whirling of bottles will not be mistaken for impurities or foreign particles by the electric "eyes."

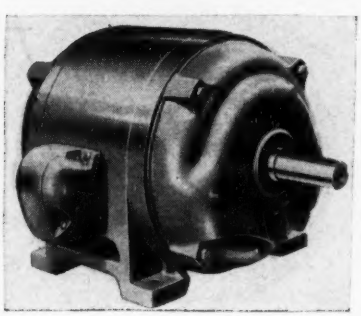
A built-in automatic "lie detector" checks all functional features of the device after each bottle is inspected, to guard against any failure in the inspection process. In event of any failure due to dimming of light source, weakening of phototubes, or any other cause, all bottles are rejected until fault is corrected.



New machine is adaptable for 12 oz. export, 11 oz. stubbie, or 7 oz. pony bottles. For bottling lines carrying a greater volume, two or more machines may be used.

New beer unit is an outgrowth of similar machines in soft drink industry, originally developed by maker in cooperation with Coca-Cola Co.—*Radio Corp. of America, 30 Rockefeller Plaza, New York City 20.*

Circle 149A on Reader Service Card



New, Compact Motors Improved Many Ways

Numerous improved features are reported for this completely new motor.

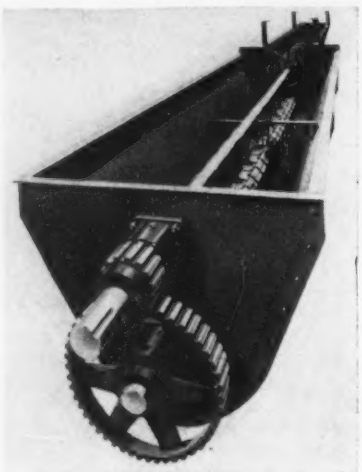
By increasing precision of manufacturing processes, holding tolerances to closer limits and improving electrical characteristics, new motor, designated as Uniclosed, Type H, is more compact than previous models. One outstanding feature is its complete dripproof design which also offers splashproof protection without increased cost. Frame is solid, one-piece cast iron and stator is pre-wound. Frame sizes 182-184 are now available.

Compactness of motor permits same hp. to be embodied in less space. End brackets are of new design with air intakes arranged to prevent intrusion of water, yet allow liberal air flow into motor for 2-way ventilation. Baffles within air vestibules of end brack-

cts prevent splashings from entering and coming in contact with windings.

Motor in its various sizes meets same standards as its former type in temperature rise, torque. Overload capacity has not been reduced. Slot design of laminations have been improved and asbestos-protected windings, have been reinforced and strengthened by addition of Mylar laminations. Split dome, cast iron terminal box makes leads more accessible. Stainless steel data plate set above box presents a rustproof surface with legible instructions. Air impeller blades on rotor ends have been redesigned with curved edges to permit more quiet operation. All castings are normalized. Lubriflush lubrication of bearings provides means of replacing old grease without disassembling motor or disturbing bearings. Air intake is designed to avoid pickup of dirt and dust from floor.—*U. S. Electrical Motors Inc., Box 2058, Los Angeles 54.*

Circle 149B on Reader Service Card

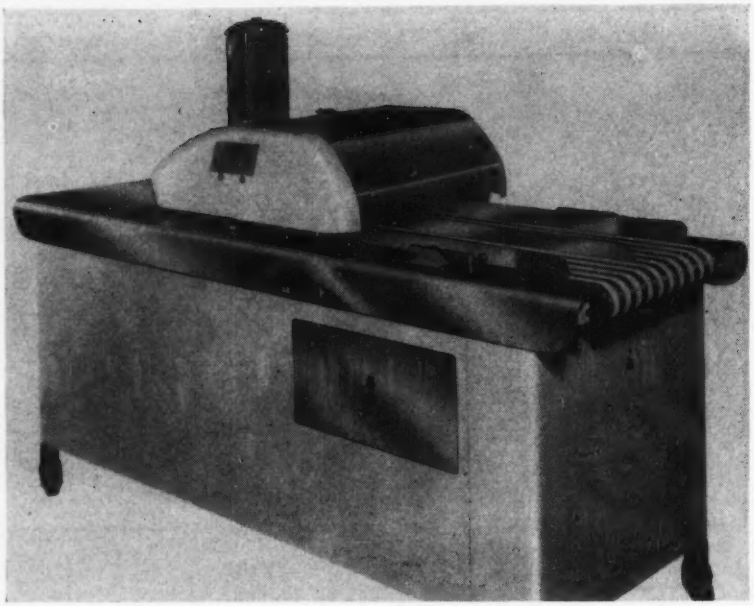


Mingler, Spiral Conveyor A Combined Unit

Of interest to the sugar industry is this new and improved, combination magma mingler and spiral ribbon flight conveyor.

Drive shaft on which spiral is mounted is built above mingler to which it is integrated by means of a pinion and gear. New unit operates from a single drive with roller thrust bearings used on drive end of trough. Combination will be available in a type and size for every capacity.—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

Circle 150A on Reader Service Card



Roller-Slicer Speeds Product Handling

This new Model "J" roller slicer handles both sandwich and weiner rolls with equal facility. It slices rolls coming direct from a cooling conveyor or hand fed.

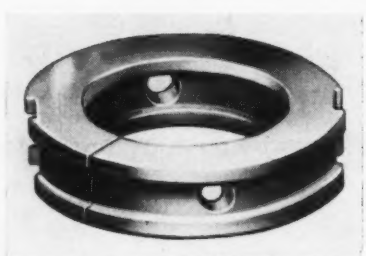
Instead of slicing roll clusters only from center, new model when equipped with five spindles hinge-slices clusters from both inside and outside. This new combined-action slicing method is said to afford considerable savings for bakeries and other roll slicer users by eliminating loose rolls, and facilitates easier handling of the product.

Unit will handle clusters of four and eight sandwich and weiner rolls, it is claimed, at speeds exceeding 2,700 packages of eight, per hr. using two or three workers at slicer and wrapper, with rolls fed to slicer in or out of pan.

Through the hinge-slicing method, unit will accommodate clusters of six-eight, or twelve rolls according to package requirements of bakery concerned. It is said to eliminate trays, reduce labor materially, and permit slicing of single rolls in pan or slicing of cluster rolls in or out of the pan. Choice of three, four, or five spindle machines is offered in the new series.

Slicer can be supplied with an aligning device which prevents damaged rolls caused by crooked feeding and keeps forward edge of rolls perpendicular to slicing knives. Used on clusters of six or eight, this feature eliminates tedious work of aligning clusters by hand.—*Alto Corp., 333 Seventh Ave., York 5, Penn.*

Circle 150B on Reader Service Card



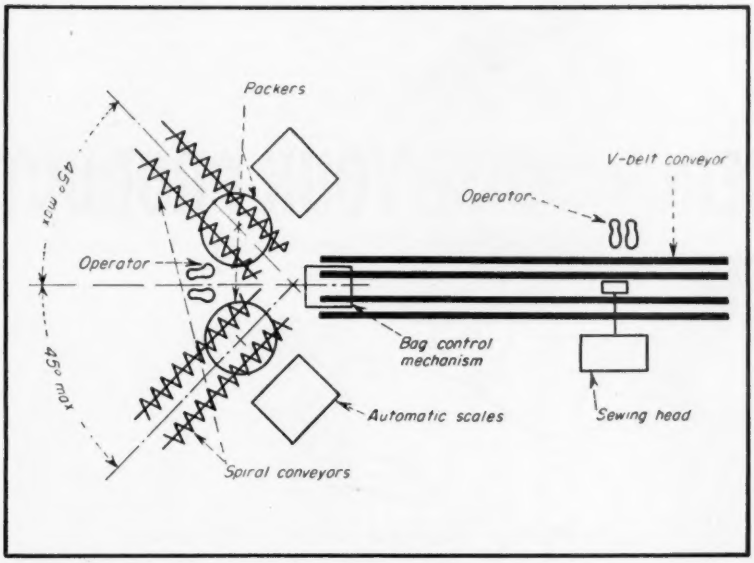
One-Piece Seal Cages Are Made of Teflon

For use with stuffing boxes on pumps, mixers, reactors and other types of processing equipment are these new one-piece, flexible Teflon seal cages.

Machined in one piece, cages can be easily snapped over shaft without dismantling pump or pulling shaft. They are reported to have long life. Design and construction provides a seal cage that will not bend or collapse under extreme gland pressure.

Cages are available in standard or special sizes to fit any pump, mixer or agitator. In ordering specify manufacturer's name, model and size, shaft dia. and stuffing-box bore.—*Chemical & Power Products Inc., 11 Broadway, New York City 9.*

Circle 150C on Reader Service Card



Y-Shaped Conveyor Expedites Bag Packing

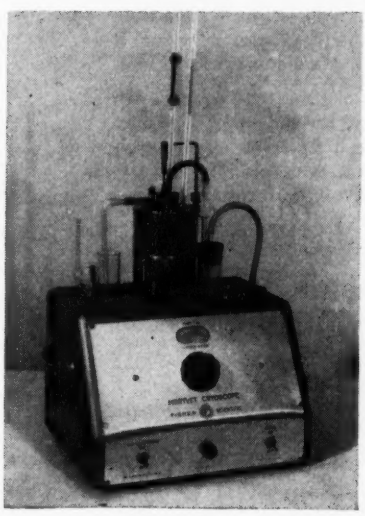
With use of a new Y-shaped conveyor, two men packing products in textile or multiwall bags can now turn out what three or four men normally did. Materials handled include flour, mashes—any light, bulky material requiring packing or settling.

System consists of two 3 ft. spiral conveyors, which form the arms of the "Y", and a specially designed 7 ft., 3 in. V-belt sewing conveyor, which forms the leg of the "Y". A controlling mechanism at receiving end of sewing conveyor is key feature. It prevents filled open-mouth bags, passing from spiral conveyors to the V-belt, from spilling or twisting.

Here's how it works: In operation, two spiral conveyors are placed under two packers. Packing operator stands between two packers, at junction of the "Y". Sewing operator is in his normal position in front of the sewing conveyor.

Operator loads one bag while other one is being packed. Using automatic scales with oscillating or bounce packers, Y-veyor turns out up to 16 100 lb. bags per min., depending on kind of material handled. Using automatic scales and auger packing, it can turn out 14, 100 lb. bags per min.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J.*

Circle 151A on Reader Service Card



Instrument Simplifies Water-in-Milk Tests

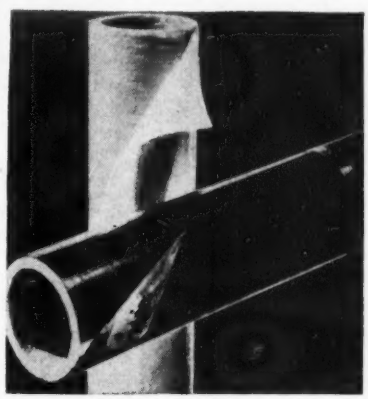
With use of this re-designed cryoscope, water-in-milk tests can now be made more conveniently, in that two important elements of the determination—stirring and ether vaporization—have been mechanized.

Milk sample is gently stirred in a steady up-and-down-motion at one-stroke-per-two sec. rate specified by the Association of Official Agricultural Chemists. Air for evaporating ether is supplied by a small electrically-driven pump mounted in instrument case. In new model, too, a collecting tube for ether fumes is furnished.

Operation is simple. An ounce of sample is placed in the instrument and cooled to its freezing-point by the ether-air mixture. Rate of air flow—and thus freezing rate itself—is controlled by a knob on front panel. Since freezing points of undiluted milk and of water are known, dial of the instrument has been marked to read directly in terms of percent of water adulteration.

Instrument has been designed as a complete "lab-in-the-hand." All necessary accessories, including a starter for "seeding" freezing action, and special freezing point and control thermometers, are mounted on the unit. Power requirement is 115v., 60 cycle a.c.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

Circle 151B on Reader Service Card



Pipeline Insulation Is Easy to Install

Ease in handling and high thermal efficiency are advantages claimed with use of a new insulation on hot and cold water and low-pressure steam pipelines.

Composed of fine fibers of glass, insulation is available with a canvas covering for installation on hot water or low pressure lines and with a black jacket of asphalt-saturated kraft paper to protect against condensation on cold water lines.

Low temperature pipe insulation will stand up under long service because inert fibers of glass will not rot or corrode. Prolonged accelerated weathering tests indicate no break down of fibers or loss of efficiency due to aging.

Material will not shrink and won't buckle or sag under changes in temperature and humidity. Appearance is improved and maintenance costs are reduced.

Insulation is primarily for indoor applications but with addition of a waterproof jacket it is suitable for outdoor use.

GAIR can help MERCHANDISE YOUR PRODUCT

with sales-appeal DISPLAY

With Gair display stands working for you in retail outlets, it's like having a company salesman in every store. The mass presentation of your product commands the attention of passing shoppers . . . the constant repetition of your sales message stimulates the urge to buy.

Do you want to introduce a new product? Pep up the sales of a standard item? Push a combination deal? Gair display stands will help.

Designed for long and useful promotional life, these stands are sturdily constructed of corrugated board and are attractively printed. For greatest visual impact, you can have your sales story printed in more than one color on a contrasting background color of your choice.

Check with the Gair plant nearest you to learn which of the many styles will make a perfect setting for your product. Learn, too, how Gair's assured supply source, design ability and delivery service help give you the best in corrugated display aids.

CAMBRIDGE, MASS. • CLEVELAND, OHIO • HOLYOKE, MASS. • LOS ANGELES, CAL. • MARTINSVILLE, VA.
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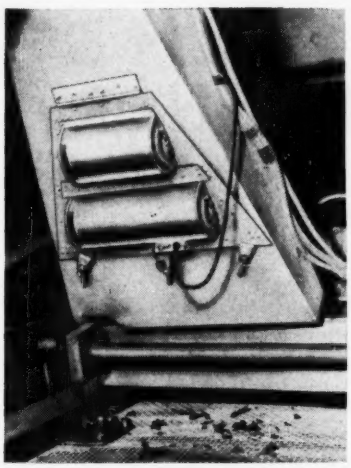
For more information, use coupon on page 181.

Cold line application is limited to cold water temperatures. Chilled water, ice water, or refrigerated water lines normally require greater thicknesses of insulation. Fiberglas Dual Temperature insulation is recommended for such colder lines—*Owens-Corning Fiberglas Corp., Toledo, Ohio.*

Circle 151C on Reader Service Card



Control Keeps Separator At Peak Efficiency

Maintenance of magnetic separators at peak efficiency is assured with use of a new control. Called Magnalarm, it employs a sensitive ferrometer which measures the quantity of tramp iron collected on magnet's face.

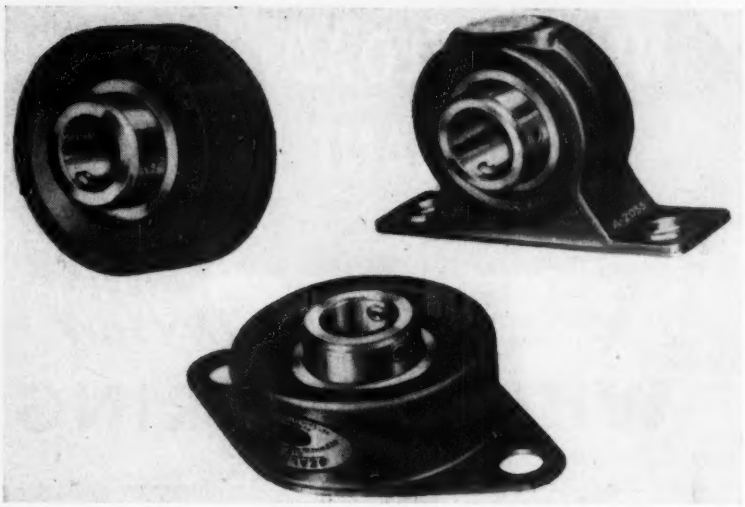
When a predetermined amount of metal accumulates on the face, the control sounds an alarm. Location near equipment or in the office, and type of alarm—lights, bells, buzzers—are optional.

System eliminates the factor of human error from simple procedure of periodically cleaning magnet. Automatically alerting maintenance men when separators need cleaning, assures that magnets will be working at maximum efficiency.

Further, maintenance time is saved in that unless alarm sounds, maintenance man knows that an inspection is not needed, and production can continue uninterrupted.

Separators are non-electric, permanent magnets made of castings of Alnico V metal. Small amount of current required to operate alarm system in no way effects magnetic field of separators.—*Eriez Manufacturing Co., Erie, Penna.*

Circle 153A on Reader Service Card



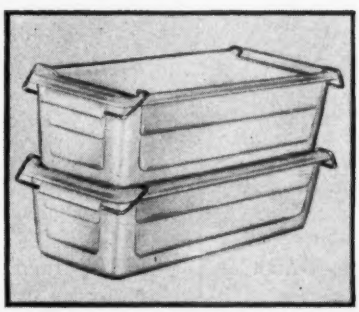
Rubber Mounted Bearings Cut Noise Vibration

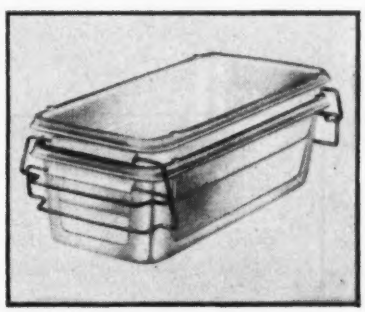
On air conditioning equipment and other light duty applications noise and vibration are reduced with use of these rubber mounted ball bearings, now available with pressed steel housings. Six shaft sizes are made ranging from ½ to 1 in. and are available as pillow blocks, flange, and cartridge units.

Synthetic rubber mounting rings are oil and grease resistant and bearings are lubricated for lift at factory. Hardening process used on inner race ring of ball bearing units heat treats through ball path section only. Since extended portions of race remain unaffected, hardened threads of set screws are able to bind tightly against soft threads of race for positive race to shaft locking.

Bearing units are grounded to pressed steel housing to prevent build-up of static charge. Housings are designed for maximum rigidity without sacrificing appearance and can be easily mounted with only two bolts.—*Stephens-Adamson Mfg. Co., Aurora, Ill.*

Circle 153B on Reader Service Card





Aluminum Tote Boxes Stack Empty and Filled

Of interest to meat packers, canners and sausage manufacturers is this new aluminum alloy tote box. Featured is a new type handle that permits stacking when the box is full and nesting when empty.

Drawn completely seamless from extra tough, heavy gage aluminum alloy, it is strong, sanitary, light in weight and easy to handle. There are no corners, cracks, seams or crevices to collect foreign matter, and the top edge is shaped to fit the hand comfortably, yet permits drainage.

Box, 34⅞ in. long, 16⅞ in. wide and 12 in. deep, has double embossing on sides an dends and triple debossing on bottom for extra strength.—*Aluminum Cooking Utensil Co., Inc., New Kensington, Pa.*

Circle 153C on Reader Service Card

NEW PAYLOAD ADVANTAGE FOR PLANT DELIVERIES

with New

WHITE STEERING PUSHER

RODEO MEATS are now transported between Maurer-Neuer plants by White "Steering Pusher" . . . the tractor that is a new payload favorite where there are big loads, tight schedules and high mileages.

These Whites operate between Maurer-Neuer plants at Arkansas City and Kansas City, Kas., with production-line regularity . . . rolling up the low-cost miles day after day with more payload than was previously transported.

FIND OUT FOR YOURSELF!

This application is typical of many very specialized transportation jobs which White can do better . . . with substantial time and cost savings . . . in all parts of the nation . . . in all kinds of businesses.

Here's how they do it!

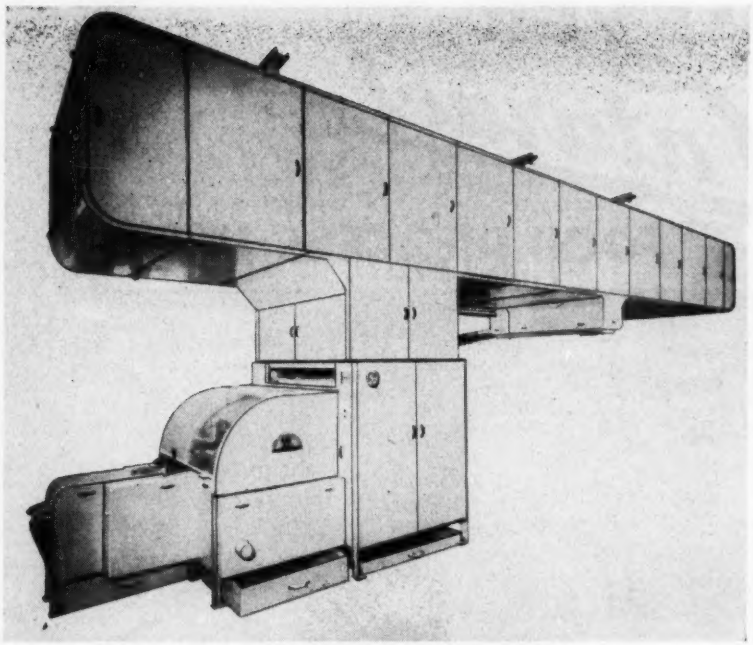
The Steering Pusher White has an extra steering axle ahead of the tractor drive axle providing trailer interchangeability, load tolerance, and improved driving. This unit permits hauling 40,000 pounds of Rodeo meat for a perfect Kansas application that boosts payload substantially. It's powered by a White Mustang Engine.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

White

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

For more information, use coupon on page 181.

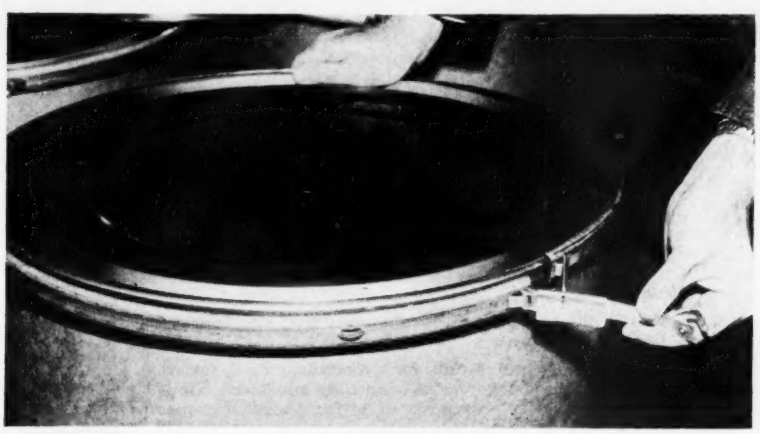


Sanitation Stressed in Tray Proofer Design

In the redesign of this time-saving tray proofer, maximum sanitation has been emphasized.

Designs specified: Easily removable trays and sleeves, with cast aluminum end pieces; complete access to all parts by means of hinged doors and lift-out covers, for easy and thorough cleaning; elimination of dirt-catching hidden ledges, by fabricating the structural frame with all flanges facing out. The result is a trouble-free, fully sanitary tray proofer.—*J. H. Day Co., Inc., Cincinnati.*

Circle 155A on Reader Service Card



Strength, Light Weight Highlight New Containers

Of interest to a wide variety of shippers are four new types of fiber containers combining strength with lightweight.

To meet various size and strength requirements, the all-fiber containers are made in sizes from 1 to 32 gal., and the fiber-metal drums come in capacities ranging from 5 to 60 gal. Diameters range from 8 to 23 in. and lengths from 7 to 42 in. Different sizes can be nested to reduce shipping costs and storage space.

Shippers wishing to maintain product or trade name identity can obtain the fiber drums with full-color lithographed labeling or silk screening to match their advertising, other forms of packaging, and color lithography on steel drums.

For hygroscopic foods, requiring protection against moisture, the fiber containers can be coated with plastic or other moisture-resistant linings. They can also be used as outer containers for polyethylene bags holding products which require maximum protection against both atmospheric conditions and damage in transit.

Drums also provide protection against storage dampness by having recessed tops and bottoms so that only the outer ring is in contact with the floor. These recesses have an added advantage of providing a convenient gripping surface when drums are being moved or stacked.

Of the four basic types of containers and closures, the simplest is the all-fiber drum with stitched tops and bottoms of the same material. The top inserts snugly flush into the drum, does not protrude beyond the drum surface, and can quickly be stapled or taped in place.

Fiber-metal drums have slip or friction tops which are flush with the diameter of the drum and permit stacking side by side without protruding top and bottom rings.

The fiber-metal drums, using a laminated fiber shell with steel heads and bottoms for added strength, are available with three different types of closures—a simple slip cover, an easy-operating friction cover, and the "Lox" ring which provides positive locking for protection of contents.—*Rheem Manufacturing Co., 570 Lexington Ave., New York City.*

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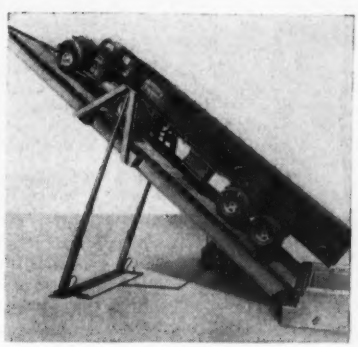
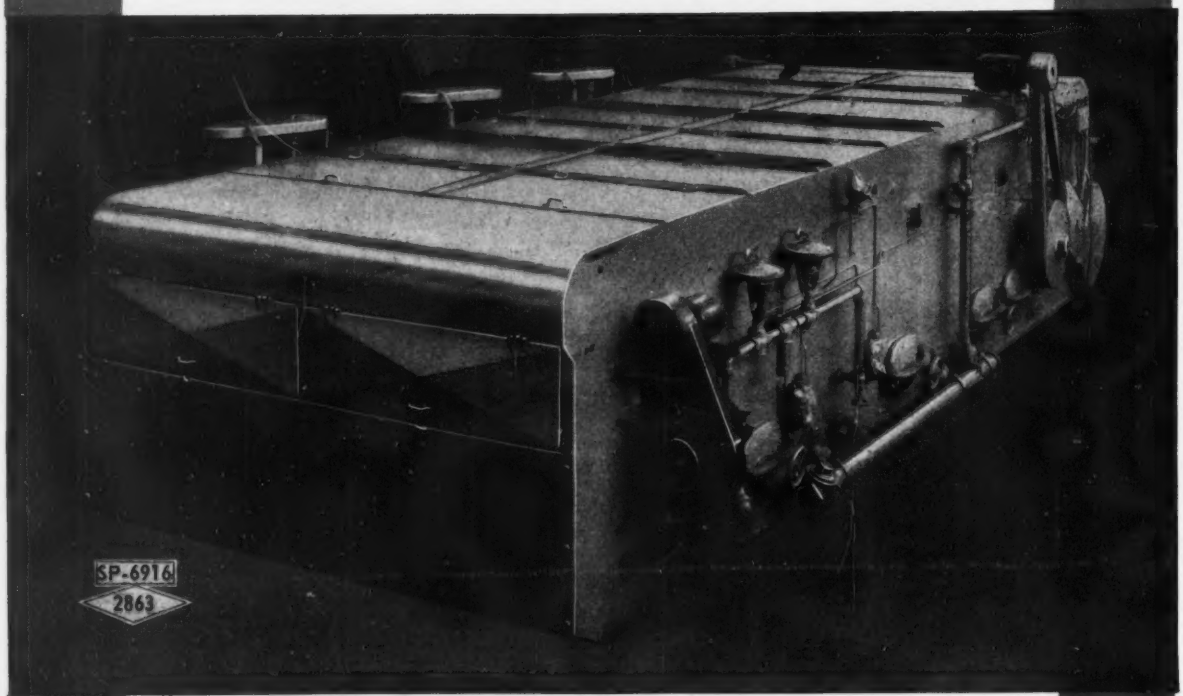


Hydraulic Truck Dumper Spurts Bulk Unloading

Grains, sugar beets, corn and similar items in bulk can be speedily and economically unloaded with use of this hydraulic truck dumper. Unit is designed to handle trucks and semi-trail-

THE MEYER *Cataract* FOOD PROCESS UNIT



for Pasteurizing, Cooling and Exhausting

A MEYER Cataract Food Process Unit is backed by 50 years experience in building efficient bottling equipment including Pasteurizers for the Brewing and other Beverage Industries and processing units for the grape Juice Industry.

The MEYER Cataract Food Process Unit is built for efficient processing. Food products may be cooled, heated or heated and cooled with the MEYER Food Process Unit at very high efficiency. The entire process of heating the product to a pre-determined temperature and/or a subsequent cooling, is accomplished within a single unit. It has proved highly efficient in a wide variety of applications, since 1939.

Designed to minimum floor space, feed at one end, discharge at the other end; also built in Multier design where floor space is limited.

The entire cooling or heating or heating and cooling operates on a continuous basis, under mechanical control. Product handling, waste water and labor requirements are minimized. Sanitary design provides for quick cleaning and visual inspection of all surfaces contacting the product packaged.

The MEYER Cataract Food Process Unit is designed for products in any and most forms of the prevailing size of glass or tin containers, likely to be adopted, from any diameter to 12½" high and particularly where one unit is to handle all types. Provisions can be made to handle containers of larger heights. Tell us of your requirements.

USED THE WORLD OVER — Dumont — BOTTLING EQUIPMENT — 50TH ANNIVERSARY

GEO. J. MEYER MANUFACTURING CO.
CUDAHY, WISCONSIN

ers up to 54 ft. long. It lifts truck with gross weight of 80,000 lb. to a 40 deg angle in 60 sec. and lowers them in 40.

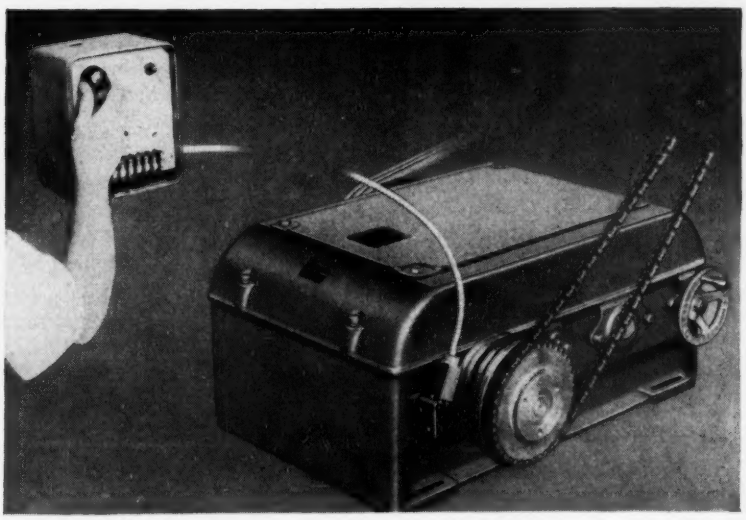
Unit has two 20 hp. motors directly connected to hydraulic pumps. Either motor is capable of lifting platform and fully loaded truck. Two, 4-sleeve hydraulic telescoping cylinders pivot at base of "A" frames on either side of platform. Remote control unit permits one-man operation.

Platform is heavily reinforced to prevent twisting or torsional bending. Wide separation of pivot points and low center of gravity provide stability.

Safety is assured by extra heavy hydraulically controlled stops that block rear wheels of truck.

Dumper can be furnished in platform lengths from 40 to 60 ft., for grade-level or pit operation or for use with scales. The 50 ft. size handles semi-trailers up to 54 ft. long, the maximum allowed on roads in most states.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.*

Circle 155C on Reader Service Card



Unit Eases Handling of Fragile Materials

No sudden starts or stops, controlled acceleration from zero to running speed, ease of handling fragile material and smooth processing speeds are advantages claimed for this new assembly, an electro-magnetic clutch combined with variable speed transmission unit.

New combination is designed for many processes to prevent damage to fragile material and to protect machinery. Load, whether light or heavy, is picked up with a smooth, application of torque from zero to maximum. Thus, undue jerks on material being processed are prevented and back lash from gear trains, chains or V-belt drives is absorbed.

Electric clutch may be applied to either input or output shaft of transmission, depending upon requirements of particular application. To obtain operating feature of selecting or changing running speeds while machine is stopped, clutch must be on output shaft of transmission. This allows pre-selection of any output speed before starting driven equipment.

Rate of torque build-up is easily adjusted and controlled, automatically or manually, through separate control panel that is furnished with this drive. Rate of acceleration may be adjusted for synchronizing motions, registering, inspection.

An additional feature of applying clutch to transmission is that it may be used to protect driven equipment, as well as motor. Because torque capacity of clutch may be easily adjusted, capacity can be set for desired loading of driven unit. As long as torque setting of clutch is not exceeded there is no overload, or slippage, in clutch. In case of a "jam" or overload, clutch serves as a safety device and allows no more than selected torque to be transmitted to driven equipment. Clutch is now available on sizes No. 0, 1, 2, and 3, horizontal transmissions.—*Reeves Pulley Co., Columbus, Ind.*

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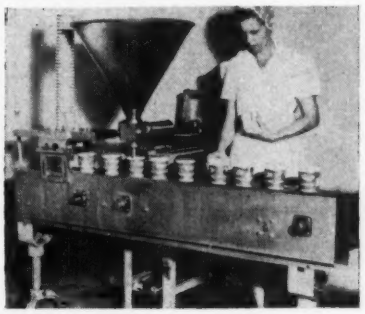
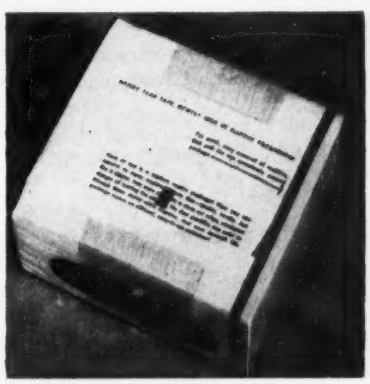


Semi-Automatic Machine Speedily Fills Cups

From 20 to 40 Seal-Ritecups per minute can be filled with use of this compact, semi-automatic machine.

Known as the Simplex, unit is equipped with an automatic dispenser that drops cups one at a time on conveyor leading to filler nozzle. Single piston filler, made of acid-resistant contact parts, dispenses automatically. Unit can handle all liquid foods or such semi-solids as minestrone soup, spaghetti sauce or spaghetti and meat balls. Unit occupies a minimum of space.—*F. L. Burt Co., 571 7th St., San Francisco 3.*

Circle 157B on Reader Service Card

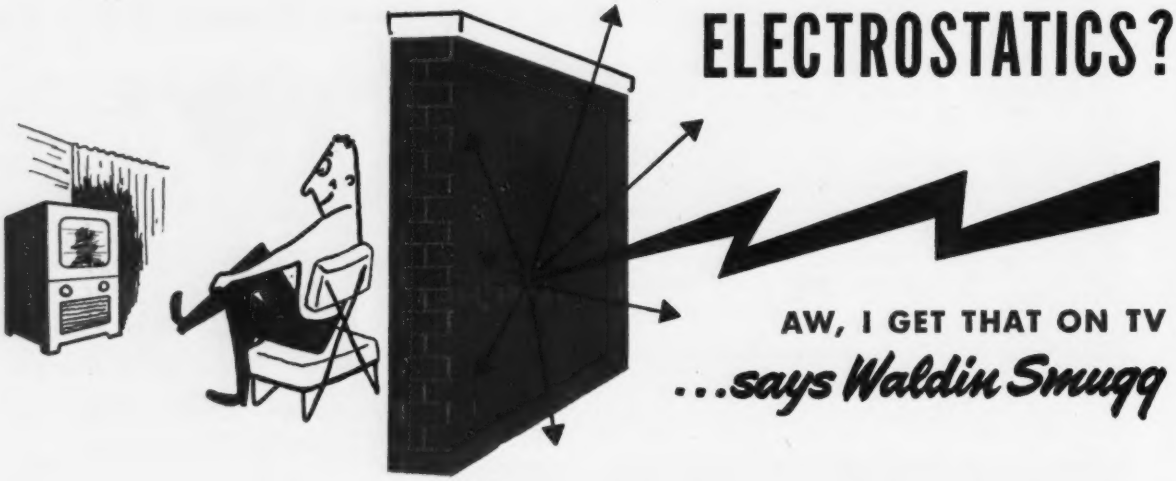


Adds Easy-Opening Tape To Large Size Packages

Large and medium-size packages can now be given the popular type of easy-opening wrap widely used on small items like cigarettes or chewing gum. A new cross-tape unit recently developed does the job.

Unit accurately locates cellophane tape at end of package, or in any desired location in relation to its length. Tape, which is available in various colors, can be $\frac{3}{8}$ or $\frac{1}{2}$ in. wide and is applied to roll-fed wrapper before it is cut off. Tape goes around entire girth

ELECTROSTATICS?



AW, I GET THAT ON TV
...says Waldin Smugg

MENTION electrostatics to Waldin Smugg, and he thinks you mean those wavy lines on his TV screen.

You see, Smugg makes a product called foodle; it's like no other food product. So *he* never reads about *other* kinds of food plants. Why should he? Electrostatics? What's that got to do with *him?*

Well, his competitor, Foodle Inc., knows. FOOD ENGINEERING told them how electrostatics could cut coating costs – and improve quality – on many foods. FE said ham-smoking had been cut from hours to minutes, for example. (Charge the ham negatively, the smoke positively, and–z-zap! Magnetism *pulls* them together.) Foodle Inc. is going to try electrostatics on foodle.

Meanwhile, Smugg – unaware of all this – falls farther behind in the march of progress.

Walled in by his narrow view – failing to watch developments in *all* food plants – Smugg could *lose* the race. For today's fast-breaking engineering techniques make "different" food plants more and more alike. All are sharing these new developments.*

FOOD ENGINEERING helps each kind of food plant use the experience of the others. It covers Smugg's own kind of plant – and *all* kinds of food plants. It publishes more on food-plant operations – and has more subscribers – than any other food-plant publication.

That's because its bigger staff can spend more time and money for better articles. And FOOD ENGINEERING uses the unmatched facilities of McGraw-Hill . . . to check into all of American industry for new ideas that food plants can use.

* * *

Waldin Smugg should *read* FOOD ENGINEERING . . . *all* of it, *thoroughly*. If you see him, tell him. If you see him in your mirror . . .

LOOK OVER **YOUR** WALL WITH **FOOD ENGINEERING**

* **COATING techniques have been exchanged between food plants through the years. This graph shows how the "engineering tidal wave" has swept from plant to plant—carrying identical methods to food plants of all kinds. FOOD ENGINEERING helps you in this "idea exchange."**

of package and can be made to project any distance beyond lap of the cellophane, making it easy to grab and tear off. Incorporation of cross-tape unit in no way affects wide range of sizes accommodated by the FA machine.

Big advantage of placing tape at end of package is that it cuts off end of wrap neatly, leaving main portion of wrapper intact. A tray or carton of biscuits, for example, can be slipped out of wrap and reinserted after a quantity of its contents has been removed.—*Package Machinery Co., East Longmeadow, Mass.*

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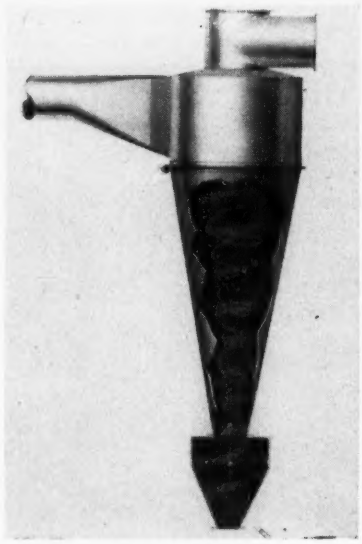

Centrifugal Collector Removes Plant Dust

Nuisance, toxic and hazardous dust in plants can be removed by this new mechanical collector.

Known as the Dustmaster, it separates dust from air by means of centrifugal force. Its operation in a dusty plant reduces maintenance, increases productivity and provides a clean working atmosphere. Collector, a cyclone of modern design, is reported to have high collection efficiency and low energy loss. Unit is economical to install and requires a minimum of space. Collectors are built in standard sizes from 18 to 84 in. dia. of body. They are available in single, duplex, quadruplicate, and two-stage arrangements. They can be operated either under suction or pressure.—*A. W. Banister Co., Inc., 23 Charles St., Cambridge 41, Mass.*

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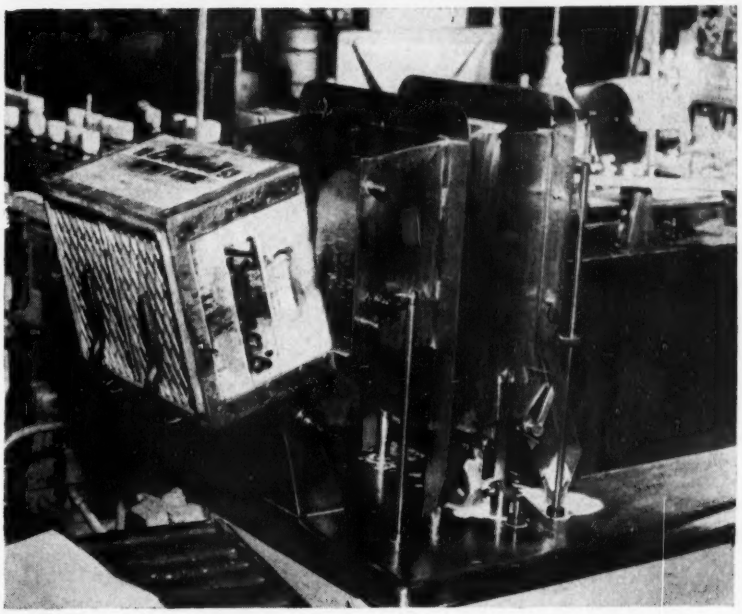


Automatically Cases Milk-Filled Paper Cartons

Faster operations and elimination of a tiresome manual task in the dairy are gained with use of this new machine. Reported as the first of its kind in the dairy industry, the machine automatically cases filled paper cartons.

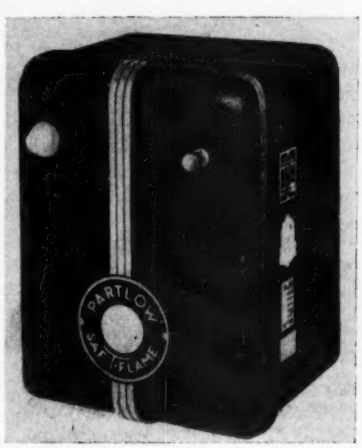
New packer is especially designed for Canco's rectangular-shape paper milk containers. Unit eliminates packing by hand and is capable of almost doubling the output of present packing method.

Machine can handle quarts, pints and half-pints and may be supplemented by an automatic case feed which will position the case on the packer. It is hydraulically operated and is equipped with a 2 hp. motor. Packer is timed to speed of filling machine and can handle 20 quarts or 60 half pints to the case.

Filled fibre cartons enter the packer in groups of five and are elevated as subsequent tiers of five containers are inserted into the packer. When all four tiers are inserted, case is placed against a trip-lever of packer and containers are automatically pushed into delivery case. The case then moves along a conveyor system truck loading platform.

Packer is capable of handling 200 cartons per min. and is designed for use with the new high-speed milk filler which will be introduced within the next few months.—*Standard Knapp Div. of Emhart Mfg. Co., Portland, Conn.*

Circle 159B on Reader Service Card



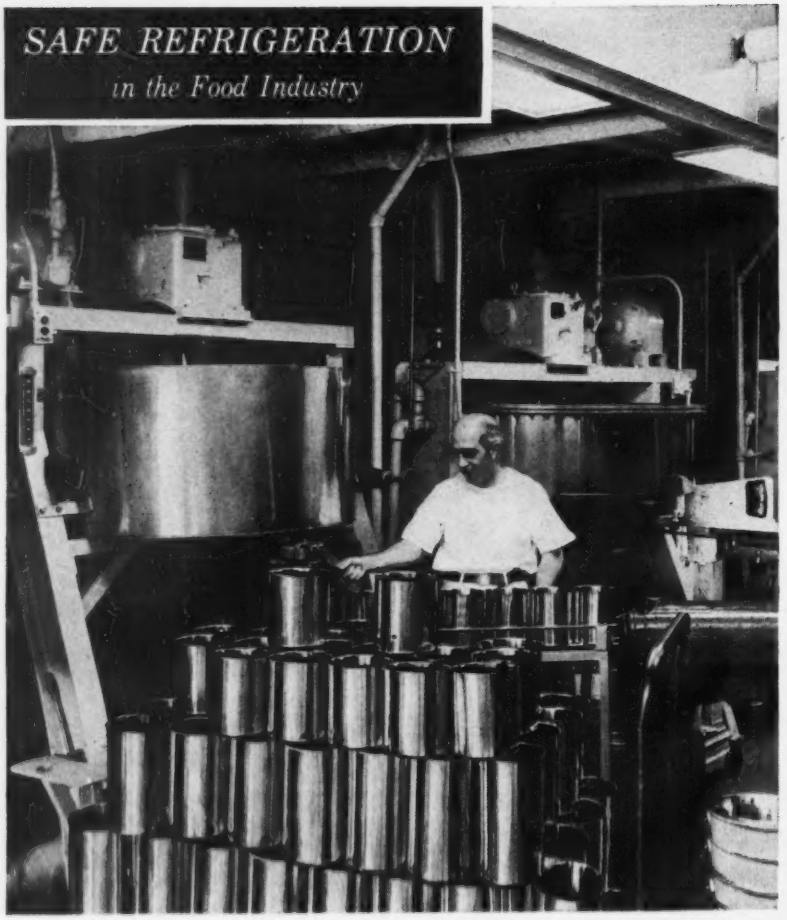
Device Protects Against Gas, Electric Failure

Protection of any gas fired appliance against damage from failure of a gas pilot or gas or electric supply is provided by the new 700 Service Safe-T-Flame units.

Unit has been especially developed for application to ovens, air heaters, immersion heaters, furnaces, metal pots, and similar industrial gas burning appliances which utilize a constantly burning gas pilot.

Device uses the flame conductivity principle to achieve instantaneous cutoff after pilot flame failure. No vacuum tubes are required.

SAFE REFRIGERATION
in the Food Industry



Battery of coolers for jams, jellies and pie fillings refrigerated by cold water from 50-ton *Worthington* compressor unit.

"Freon" refrigerants team up with this 35-ton compressor to provide refrigeration in cooler room.

-2°F. temperatures greet this employee in the freezer room, where many types of fruits are preserved in 30-lb. tins.

Modern Boston plant . . . another food-industry operation to choose "Freon" refrigerants

The H. A. Johnson Co., large food manufacturing firm, uses the latest electronic and mechanical controls in its functional, 2-story plant. It was designed to meet the needs indicated by an engineering study made when Johnson's operated in five separate buildings, and stored frozen foods in public warehouses.

The air conditioning system used in the offices depends on a 50-ton *Chrysler Airtemp* compressor; "Freon"* safe refrigerants make the use of an efficient direct-expansion system possible. Two *Worthington* compressors of 35-ton capacity use "Freon" refrigerants to supply refrigeration for the freezer room, used for storage of canned frozen fruits, and the cooler room, where dried fruits and nut meats are kept. Another *Worthington* 50-ton compressor supplies refrigeration for processing operations.

Refrigeration units are fully automatic and are installed near the point of use, so constant supervision in a central power plant is not required. Safe "Freon" refrigerants permit this flexibility of equipment installation. The automatic operation includes hot-gas defrosting.

Choice of equipment operated with "Freon" refrigerants is indicated in modern food plants such as this. "Freon" refrigerants are ideal for every refrigerating need in the food industry . . . in processing, transporting, storing and selling. They are safe . . . nonflammable, nonexplosive, noncorrosive and virtually nontoxic. E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Div., Wilmington 98, Delaware.

KINETIC

FREON

REG. U.S. PAT. OFF.

SAFE REFRIGERANTS

"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

A specially designed pilot burner is provided which is fitted with built-in flame-sensing electrodes and easily installed as a single unit. Special fittings and adaptors are available which will allow this pilot burner to be installed on most types of gas burning equipment, with little alteration.

Pilot burner is electrically ignited by a push button on front of control case or, in automatic models, mechanically after a present purge time delay. Double units are available for multiple burner applications consisting of burners in pairs.

Flame conductivity principle, uses ability of a gas flame to conduct an electrical current better than air. By placement of suitable electrodes in pilot gas flame, a small electric current flows across flame and ceases when flame is extinguished. This current operates a relay which controls electrically operated valves in fuel line. Thus, when pilot is extinguished, entire fuel supply is instantly cut off.

Electrodes surround pilot flame preventing fluctuation or wavering of flame from breaking circuit and causing premature tripping of valves. Alloys used in electrodes have been carefully selected for heat, flame, and corrosion resisting properties.

Another feature of pilot is that it will conduct sufficient electric power to operate relays directly. High voltage is used on electrodes so that pilot is a complete self-lighting unit. All models are approved by Associated Factory Mutual Laboratories.

Each model in the 700 Series is a complete unit consisting of control cabinet, transformer and pilot burner, with air mixer. All models are available for 110v, 60 cycle a.c. only.—*Partlow Corp., New Hartford, N. Y.*

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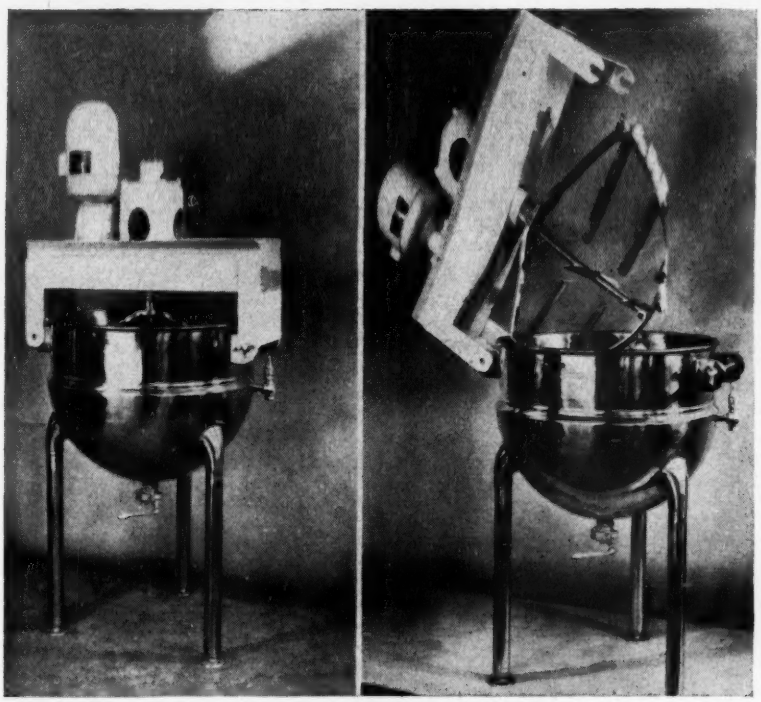

Mix-Cooker Agitator Is Readily Removed

Fast and thorough mixing and cooking is claimed with use of this new, sanitary, style SA steam jacketed kettle.

Double motion agitator, in which paddles turn counter clockwise and scrapers clockwise, provides speedy and thorough mixing. Nylon scrapers eliminate surface film on jacket which results in speedier cooking.

Precision cut gears smoothly and quietly drive agitator through oilless bronze graphite bearings.

Mix-Cooker can serve as a double-duty unit. Agitator assembly can be readily removed from kettle, for cooking products not requiring agitation.

Kettles are available in 30 to 500 gal. sizes with either variable speed or constant-speed drives, with or without agitator. They are built for pressure of 90 and 125 psi. Designed for utmost sanitation, stainless steel kettle has no flanges, joints, or crevices where bacteria or food residue can collect. Surfaces are polished to a high lustre inside and out. Kettle is ¾ jacketed. Cylindrical legs are sealed and adjustable. For permanent floor installations, floor flanges are furnished.—*Hamilton Copper & Brass Works, 820 State Ave., Cincinnati.*

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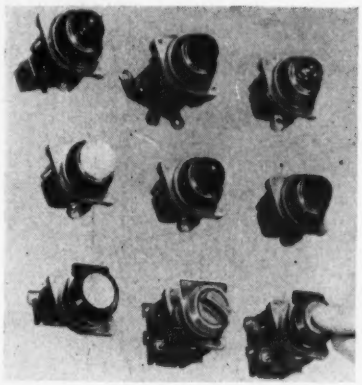


Indication Lights Have All-Angle Visibility

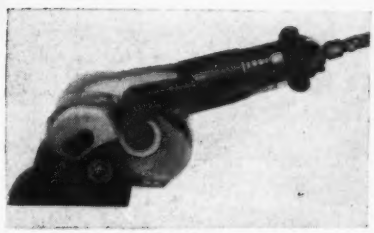
Pushbuttons, selector switches, and accessory controls can now be equipped with these new, heavy-duty oiltight indicating lights.

All-glass faceted lenses of new lights are factory sealed to metal caps, and feature all-angle visibility. They are available in six colors: red, green, white, blue, amber and clear.

To provide more versatility and easier installation, the lights are designed for both front and back mounting.

Available in three forms—resistor, transformer, and full-voltage—they are rated from 100 to 600v. with a 10 amp. continuous rating.—*General Electric Co., Schenectady 5, N. Y.*

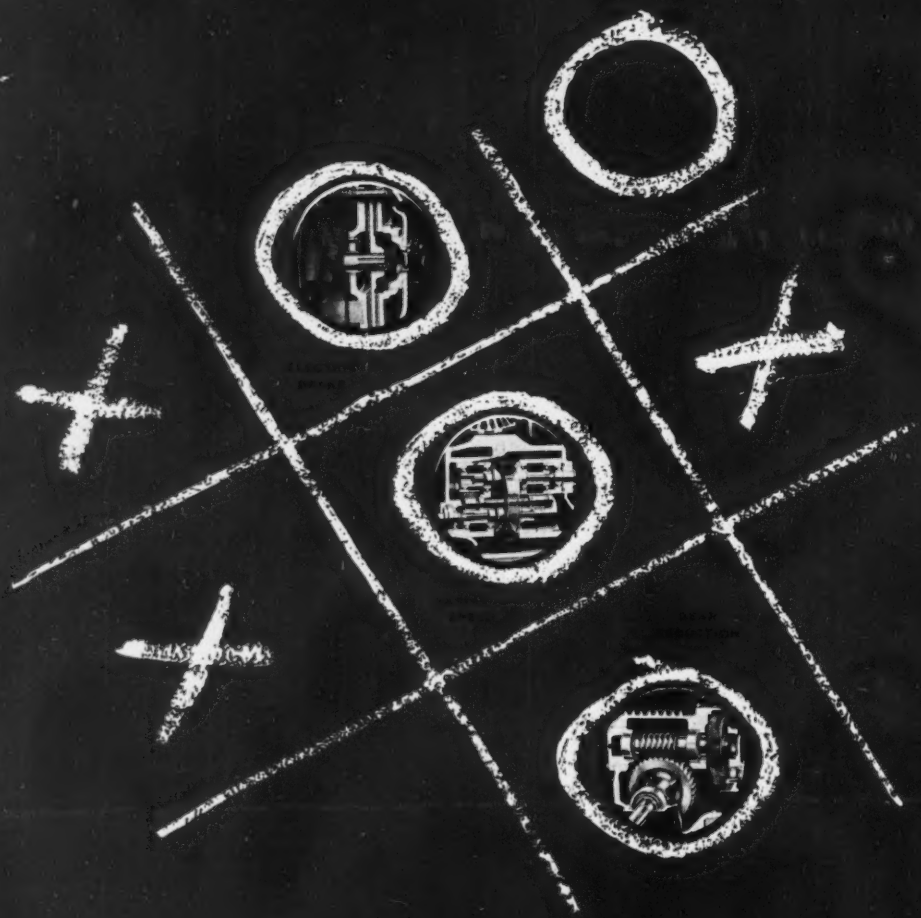
Circle 161B on Reader Service Card



Pneumatic Tools Speed Steel Strapping Jobs

In production line steel-strapping applications, the operator's work is eased and packaging operations speeded with use of these new simple-to-operate tools.

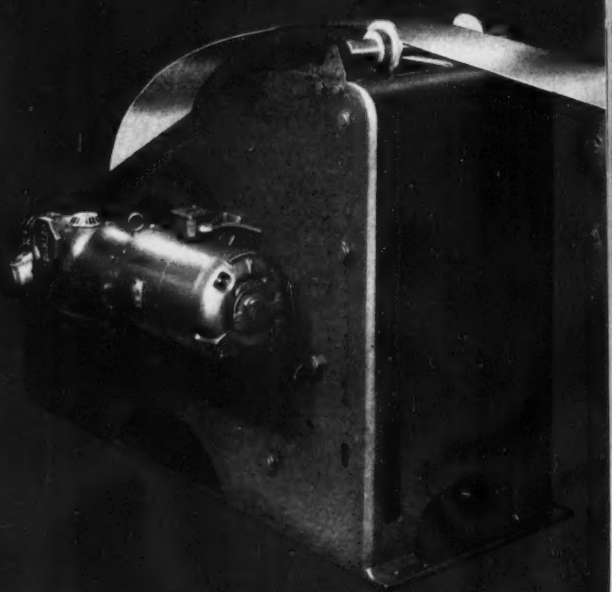
Pneumatically powered, stretchers



No child's play, this business of properly applying electric motor drives. But you'll find it much easier if you can line up exactly the features you need in one compact, integrally built power unit.

And nowhere will you find a wider selection of sizes and types of electric motors, gearmotors, variable speed drives, fluid-drives, electric brakes, etc., than Master has to offer . . . and they're all designed so they easily combine into a power drive that's just right for each job.

Use Master power drives to increase the salability of your motor-driven products . . . improve the economy and productivity of your plant equipment.



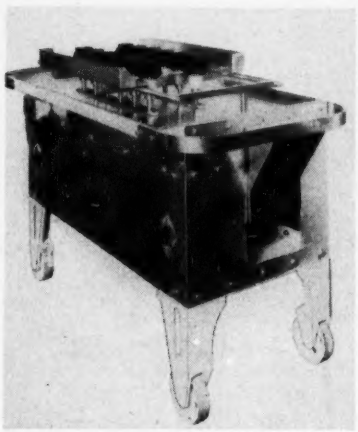
THE MASTER ELECTRIC COMPANY

DAYTON 1, OHIO

are reported ideal where pre-determined, uniform tension is required. Each strap is applied with same tension as one preceding it. Any amount of slack strapping can be taken up by friction type stretchers, which are designed with rotary gripping dogs.

A wide variety of strapping jobs can be done by these tools, including: circular containers; packages, bundles; skids; and pallet loads. Tools will handle strap widths from ⅜ to ¾ in. and thicknesses from .010 to 0.23 in. Stretchers range in weight from 3½ to 9½ lb.—*Acme Steel Co., 2840 S. Archer Ave., Chicago 8.*

Circle 161C on Reader Service Card



Tandem Brush Unit For Cupcake Pans

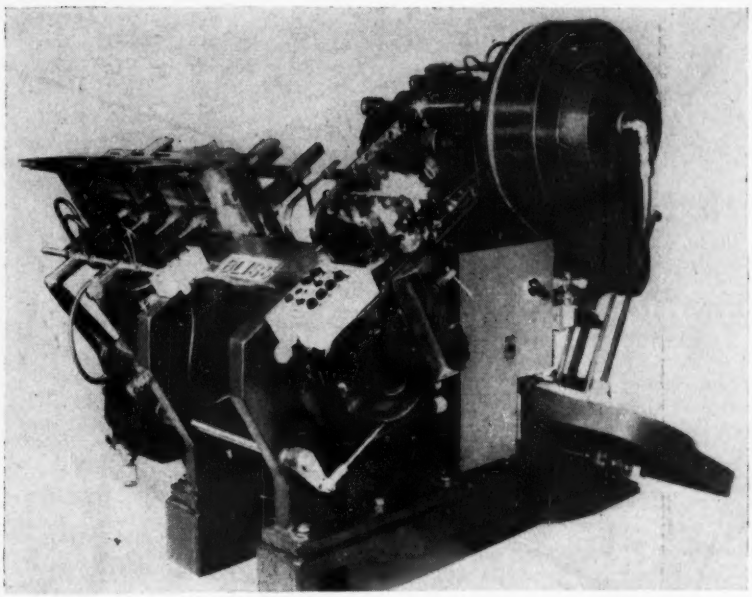
This new tandem cup-brush machine takes the work out of cleaning and greasing "brown and serve" bun, muffin and cupcake pans.

Machine permits an operator to clean and grease twelve, 24-unit pans in the same time it takes to grease one. A greasing guide on either side of brushes allows immediate positioning of pan over brushes and eliminates fumbling. Operator cleans and greases first and third rows on initial motion and second and fourth rows on next motion.

Brushes, made of strong, long wearing bristles, oscillate on spindles. Grease is moved into brushes by a plunger type pump to give right amount of grease.

Unit is made of stainless steel for most part and is portable to permit easy movement to bakery production lines. Entire top of unit lifts off for easy access to parts for servicing.—*Imperial Machine Co., 925 N. Darien St., Philadelphia 23.*

Circle 163A on Reader Service Card



Produces Can Ends, Closures at 300 Per Min. Rate

This completely-new automatic strip feed press, No. 1831, produces sanitary can ends and closures at speeds beyond 300 strokes per min.

The following features have been included in the design to facilitate continuous operation at high speed and to minimize vibration and maintenance:

Combination disk friction clutch and brake, electrically controlled, permits instant starting; balanced crankshaft (4 to 6 in. dia. at bearings and crankpin) minimizes vibration. Feed bar, driven positively by crank instead of lever, has adjustable fingers. Bar is adjustable for all sizes without removal. Idle stroke between strips has been eliminated. Bolster area has been increased to 17 in. front to back by 16 in., left to right. Press timing has been arranged for slide to stop automatically at top of stroke.—*E. W. Bliss Co., Hastings, Mich.*

Circle 163B on Reader Service Card

Quickly Strains Slurries Of Oversize Particles

Fast, continuous straining of oversize particles from process streams is accomplished by a new "Bantam" machine. Unit features small space and power requirements and prevents combination of product by continuous removal of particles. It is designed to handle fibrous or viscous slurrys and is equipped with motor-driven scrapers or brushes to prevent particles from plugging openings.

Primary applications of unit in food process industries are where maximum pulp or particle size is important or where straining of feeds to centrifuges and other machines is required.

Simple, low-speed design provides

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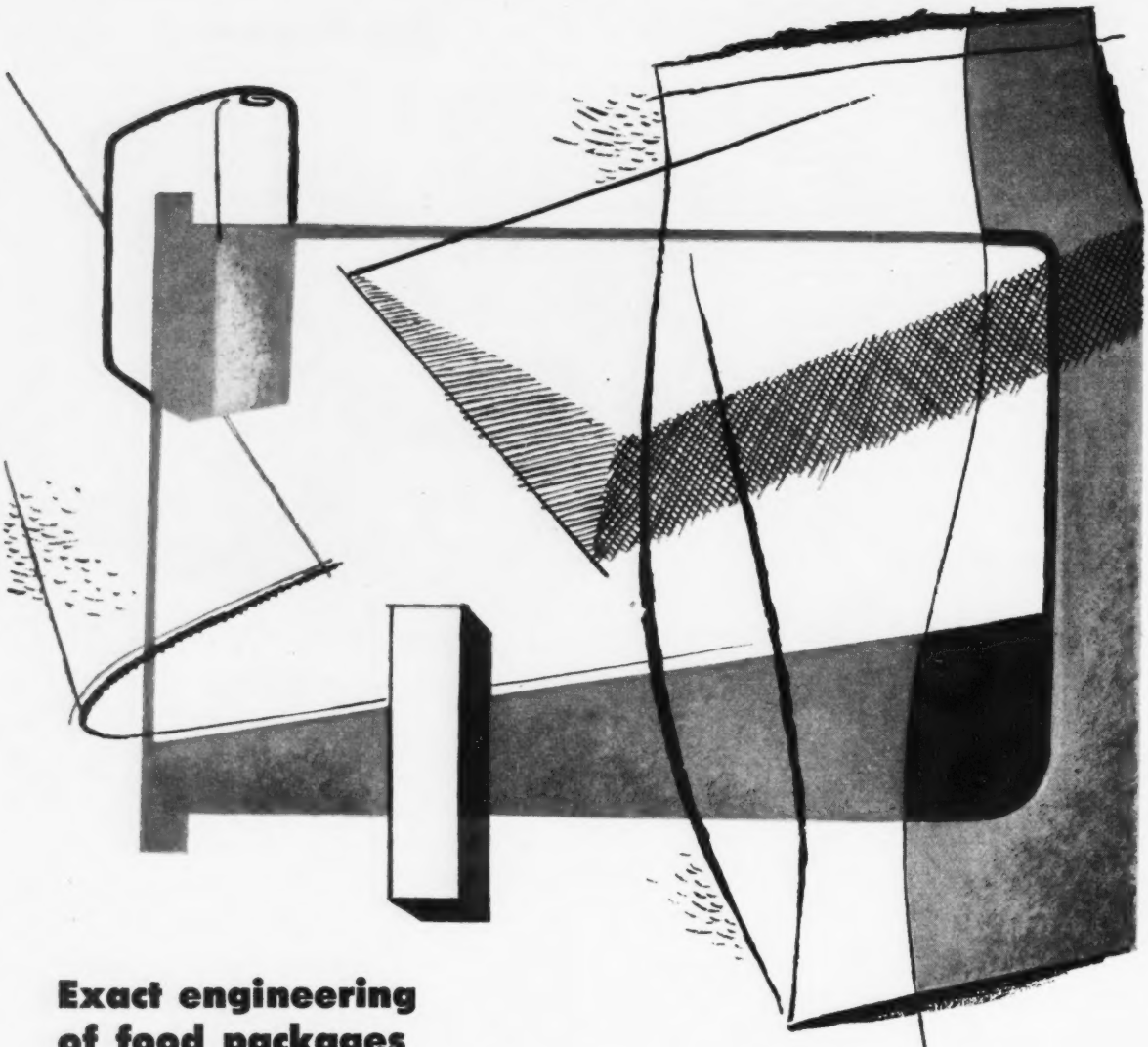
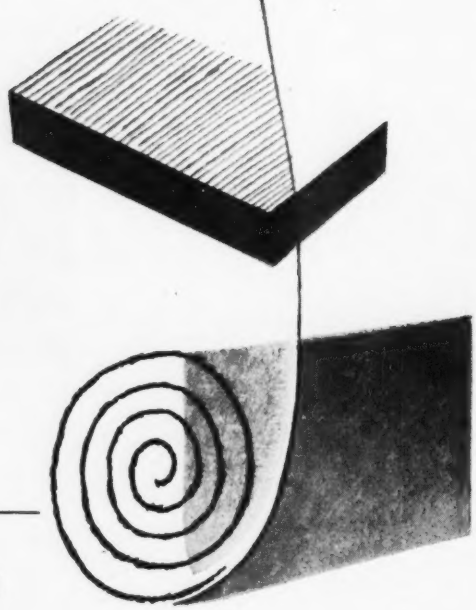


Exact engineering of food packages

"Is this food package idea practical?" is a question that is asked at Shellmar-Betner as often as "Is this design striking?" To answer it, we draw not only on our years of fine printing, but on our wide range of knowledge of food packaging materials, machinery and processes. We stand ready to help in the development and building of specialized machinery. This extra knowledge works for you—as it works for hundreds of other food package buyers—whenever you call on Shellmar-Betner.



CONTINENTAL CAN COMPANY

SHELLMAR-BETNER

FLEXIBLE PACKAGING DIVISION

MT. VERNON, OHIO

easy maintenance. It measures 15 in. in height, 17 in. in width, including motor, and 14 in. in depth, including motor. Capacity is from 1 to 100 gpm., depending upon the type of application.—*Merco Centrifugal Co., 150 Green St., San Francisco 11.*

Circle 163C on Reader Service Card

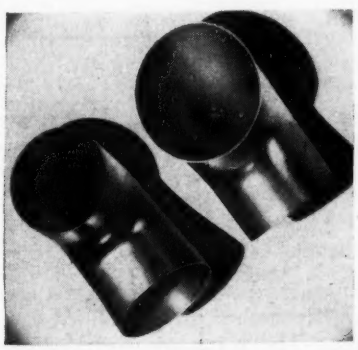
Wire Mesh Conveyors Are Easy to Install

Design simplicity of these new power-driven, wire-mesh belt conveyors makes installation easy.

Both stationary and portable models are available in a wide variety of widths and lengths to handle light and/or heavy products.

Typical operations which can be speeded and made continuous with use of mesh carriers are: washing; spraying; cooling, freezing; cooking; baking.—*Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.*

Circle 165A on Reader Service Card



Stainless Elbows Formed From Single Tubes

Instead of half shells welded together, a single piece of .026 in. high strength stainless steel tubing forms this transition elbow. Tubing has been successfully bent to a right angle, and the 2⅛ in. dia. at one end has been gradually stretched to 2⅜ in. at other end.

Both "standard" and "high strength" stainless steel straight wall tubing are available. Latter gains greater yield and tensile strength for same wall thickness through a work-hardening process. For example, for a standard type tube 3 in. O.D. to carry maximum working pressure of 500 lb. requires a wall thickness of .025 in.

In the new high strength tubing, same pressure could be carried with wall thickness of .014 in. effecting a weight saving of .335 lb. per ft. or 40 per cent.

Standard straight wall tube is available in 15 outside diameters ranging from 1 to 6 in. High strength comes in 13 outside diameters, from 1.50 to 6 in. All but smaller sizes are available in four wall thicknesses designed to withstand various pressures.

Fittings and component parts can be attached to straight or flexible tubing by resistance circumferential seam welding.—*Flexonics Corp., S. Third Ave., Maywood, Ill.*

Circle 165B on Reader Service Card

Canner's Conveyor Belt Improved Four Ways

Four improvements are reported for a canner's conveyor belt, now used for all kinds of food handling.

Without affecting its basic characteristic of not imparting taste or odor to food products, maker has compounded a tougher rubber cover that improves the carrier four ways.

Final laboratory tests show that new sanitary service belt has 30 to 35 percent more abrasion resistance and its elasticity has been increased more than 25 percent.

New belt has 12 percent more resistance to tearing and its tensile strength has been increased up to 100 percent. Belts with white or tan colored rubber covers average 40 percent more tensile strength, while black cover compound has an average of 100 percent more tensile strength.

Former characteristics of stain, acid and mildew resistance in old product have been maintained in the new.—*Goodyear Tire & Rubber Co., Akron 16, Ohio.*

Circle 165C on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 181. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

New Chemicals

Coffee Enhancer Restores Aroma Lost in Process

Flavor and aroma lost during the processing of instant coffee is restored with use of a recently developed "coffee enhancer."

New material is obtained by organic synthesis of flavor elements present in the original coffee bean, before processing into powdered form which removes much of the highly voltatile flavor and aroma constituents. Product comes in liquid form and when added to soluble coffees in minute quantities restores the important psychological effect of fresh coffee aroma, not only in jar itself, but also in beverage brewed from it.

It is suggested that the enhancer be sprayed on product after drying process has been completed. Operation is simple, equipment requirements are negligible. Dissolved in a suitable solvent such as ethyl alcohol, ¼ to ½% of enhancer is sufficient to give the desired effect. Enhancer may also be used to impart aroma to roasted coffee, although its most important application will be in the instant types.

Maker stresses fact that new product is not a flavor for general use but an "enhancer" developed for the specific purpose described.—*Dodge & Olcott, Inc., 180 Varick St., New York City 14.*

Circle 165D on Reader Service Card

Garlic Characteristics In Synthetic Aromatic

Natural flavor characteristics of pure garlic oil are claimed for a new synthetic aromatic.

This direct substitute for garlic oil is a 100% pure chemical, an unsaturated sulfide compound the result of considerable experimentation by the maker's research laboratories. Intensive tests have been made on the material's lasting strength and blending qualities through various periods. —*Florasynth Laboratories, Inc., New York City.*

Circle 165E on Reader Service Card

In Behalf of Progress . . .

Management Opportunity Challenges You

It's no longer news that there is a shortage of technical personnel in the food industry. But it may come as a surprise to some that the trouble goes much deeper than that.

There is an even more serious dearth of men qualified to step into managerial jobs.

This unhappy situation was spotlighted early this year by a dairy committee study. While reporting that the average is only 6.5 senior students in dairy technology for each of the 48 dairy schools, the committee questioned the caliber of some of the young people enrolled in dairy courses. Their suitability to become future executives was doubted.

And another fault was found with the colleges. They turn out too many "technological illiterates"—men remiss in their ability to discuss the simplest subjects of general interest.

Your Industry's Responsibility

Now all the blame cannot be dumped on the doorsteps of the schools. Most of it must be placed upon industry itself. Many of the dairy schools are conscientiously producing the type of trained men that the industry demanded in the past. In other words, they have been giving their "customers" what they wanted.

The dairy field itself has not yet awakened to the changing times and the corresponding shift in technical personnel requirements. For the dairy committee also reported that virtually nothing is being done to interest young men in the business. Nor are plants doing much to train the young people they already have.

Let us hasten to say that there is no point in picking on the dairy schools or the dairy processors. Both are above the average for the food field as a whole.

Their shortcomings go double for some other branches of the industry.

For much too long a time, most food factories have used technical men for their scientific abilities only. And to be brutally frank about it, they have not even begun to hire and utilize technical know-how to the extent called for by their own best welfare.

But the pace setters are changing their tactics. Not only are they hiring more technical people, but they are trying to bring them up the ladder of progress to managerial positions. In some instances —all too few, to be sure—this ladder leads to the company presidency.

One of the best run companies in the food field is putting young technical men into foremen's jobs. Some are using promising quality control technologists as assistant production supervisors. The idea is to end up with factory operation managers who have a solid technical background.

After all, food manufacturing is a technical business. The management of each and every plant is in technical competition with that in scores and hundreds of other food plants.

And the biggest survival task facing food companies today is that of cutting the costs which add nothing to the value of the product. This permits them to spend as much or more where quality is added and yet come out with lower total cost.

Management which knows the technical angles has the advantage.

So what's to be done?

If you are on the way up, capitalize on current conditions by broadening your range of abilities to qualify you for the higher jobs. Don't force top management to pass you by when it fills a nice position requiring broader knowledge.

If you are in an executive position now, then you have two vital personal responsibilities to your company.

One is to stimulate the education of more and better qualified young technical men. And the other—much closer to home—is to develop your technical men to fit the jobs ahead of them.

Some of the more enlightened food companies are enrolling promising "comers" in special college courses. Others operate training programs of their own. Still others utilize courses set up by their association.

More of this type of thing needs to be done. But before that—and with it—comes self-education through attendance at association meetings and the reading of industrial and technical publications.

Your Personal Obligation

If you or any of your subordinates think you are 'too busy' for such "extra curricular" activities, you better think again. The extremely busy leaders make time for self-improvement—both to the benefit of themselves and their companies.

Look at your personal time as you do at plant operations.

Save where there is no value added. Put more into the activities which enhance value.

Nipping Costs

—Continued from page 68

outlet temperature is maintained by a thermometer controller that keeps cooling water within 1½ F.

From enrober tank, seeded chocolate flows through the rise, where very close temperature control is automatically maintained. Water that is too cold in the riser jacket causes "freezing." And since liquid chocolate transfers heat poorly, only a small amount of cooling occurs in the riser. Then real trouble starts. Enrobing temperature must be held within ± ¼ F., and this final trimming action of a high degree of accuracy must be accomplished in the riser.

One requirement for a good control system is to provide chocolate of a constant seed, viscosity, and temperature to the enrober.

After a day's run, drip kettles are filled with desired amount of chocolate and, by means of a switch control, transferred to a time-pattern controller. A cam on this instrument is cut to a maximum temperature (well above seeding point) to assure holding chocolate in liquid state and free of crystaline seed. At a predetermined time during the night, the temperature, determined by the cam, is lowered to desired seeding point and ready for start-up in the morning.

Deviation Held Close

With the tempering cycle predetermined, and the cam cut accordingly, temperature again is automatically raised to proper degree and held for the necessary time interval before chocolate is fed to enrober tank. Time temperature curve of the chocolate at this point follow the cam pattern so closely that deviation is never more than ±½ deg. F.

This plant also is equipped with the Latini spray system for pan goods requiring chocolate. A system for tempering cholocate again is automatically controlled in a manner similar to that employed for drip kettles. Taken into account is slightly different temperature and cycling conditions.

In cooling, drip, and pan kettles, temperatures are measured with thermocouples mounted on agitators. Required is a rotary contact-type pickup so that the millivolt signal from thermocouple can be transmitted to the instrument. Here, experience and knowledge are invaluable, because of lubrication and corrosion problems as well as adverse effect of dust, grease, fumes, etc., on sensitive rotating contacts.

Other applications of instrumenta-

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Machine bundling gives you a completely automatic operation that cuts costs amazingly.
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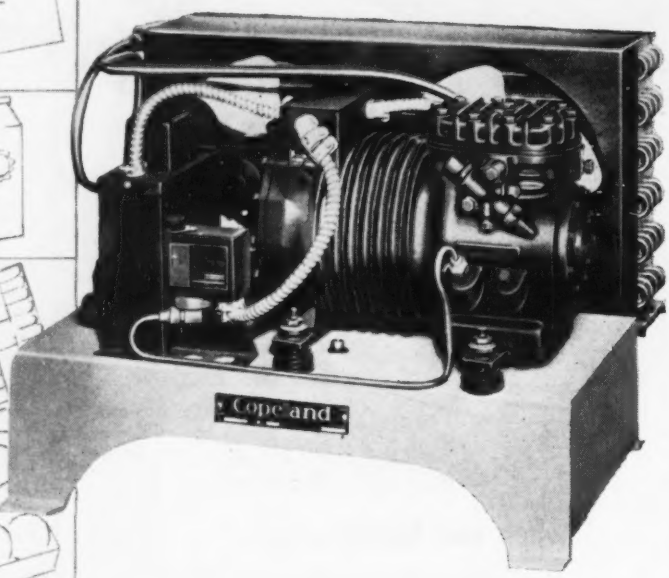

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For pre-cooling, freezing or storage, many large processors depend on practical COPELAMETIC refrigeration units. In an industry where low-cost operation and continuous unfailing performance are vital, COPELAMETIC has earned top recognition.

Copeland's design leadership has drastically reduced maintenance, by eliminating all belts, seals, and manual oiling from COPELAMETIC. And Copeland *added* accessibility! Should the rare need arise, the unit can be serviced instantly, on the spot. No unnecessary shutdowns, no sending back to the factory.

COPELAMETIC runs, quietly, economically . . . gives consistent high BTU for minimum cost. There are self-contained and remote units for every application.

WRITE FOR BULLETIN C-54

Copeland
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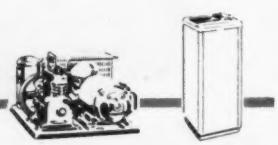

COPELAND REFRIGERATION CORPORATION • SIDNEY, OHIO

tion and automatic control include the various kettles fire,—bob, Simplex caramel, and fondant. Further points are the different rooms—gum and cream casting and starch drying.

In these instances, management felt it more desirable to have an end-point signal (indicating completion of process). Employed are single instruments connected through selector switches to thermocouples for determination of end-point temperature of material in two or more cookers. Each Simplex vacuum kettle, for example, is also provided with its own pre-cook kettle. There is a thermocouple in pre-cook and in vacuum kettles, with temperature of either read on the same electronic instrument by turning the selector switch as kettle approaches process end-point.

Similar installations are provided for all other cooking operations. In the cases of kettles without agitators, portable, instead of permanently installed, thermocouples are used. Reason: Easier cleaning of kettles.

Thermometer-type instruments control Huhn starch dryers.

Marshmallow gum and cream-conditioning rooms require their own temperature and humidity conditions, which are controlled within close limits by circular-chart electronic instruments for temperature and humidity.

An interesting application for humidity control is a small detecting device that consists of a plastic plate on which are fastened two small gold electrodes. Device is coated with a hygroscopic material. And a minute e.m.f., caused by variations in humidity, reads directly on a scale (and a chart) calibrated in %-humidity. Control point is set at desired value, and accurate regulation is maintained.

Other conditioning and storage areas, such as hard candy, mint conditioning, chocolate, chocolate goods packing, and perishable storage rooms, as well as finished goods warehouse, are all held at controlled conditions of temperature and humidity.

Another interesting feature is handling of corn syrup and master mix, which are stored in temperature-controlled tanks. Regulation is by a thermometer-bulb instrument, operating a steam valve that supplies the jacket of each tank. On master-mix tank is a liquid-level indicator. Corn syrup and master-mix pipe lines are insulated and heated by electric resistance heaters, and temperatures are controlled by a recording thermometer, which is actuated by an averaging bulb along the pipe lines.

By means of an electro-vane control, the recording thermometer operates relays to cut in or out more or less resistance heaters to provide ex-

tremely accurate temperature control.

Statistical Quality Control Applied

There is more to statistical quality control than mere adaptation of statistical methods to quality-control work, reported W. H. Corwin, Brock Candy Co., Chattanooga, Tenn. It is also a proved system for maintaining high standards of manufacturing quality goods at minimum cost, and a major contribution to manufacturing efficiency. It achieves large savings in production costs by preventing wastes, eliminating rework or scrap, and reducing amount of inspection

As an example how statistical quality control is applied to improve quality, cut costs, control weights, and reduce scrap, production of this firm's leading product—a nut roll—was illustrated.

First process is making and forming the cream center, which is sent into molds by a battery of pumps working in unison. Weight of cast center is carefully checked, since variations in pumps, machine setting, and fluidity of candy produce irregular weights. Periodically, pump bars are checked to see that each pump is depositing the correct volume of center. This revealed faulty pumps as the cause of non-uniform center weights. Average and range charts were used on weight and thickness variation and, within three months, weight variability was reduced from 16 to 6%. Thus the thickness variation ceased to be a probem.

An enrober, where center is dipped in caramel, weight of caramel is checked. Also, amount of peanuts dipped center picks up is calculated. A control chart is plotted, which shows the operator the kind of job he is doing. By observing the control chart, he is able to determine when his process is varying, and when his weights are changing.

Centers with caramel and peanuts then go to enrober room to be dipped in a compound coating. Samples constantly are run to let operator know percentage of coating going on the bars. By putting samples through enrober at various spots on the belt, variations in fan velocity, vibration, and levelness of belt are easily corrected.

At the time statistical control was put into operation on the bar line, scrap averaged 5 to 6% of total production. Now it is below 2%.

Maintained are inspections of finished packages and frequency distribution of finished weight. Total variability of product has been reduced by 25%.

A 25 to 30% savings in color costs and more uniform colored batches are achieved by making up stock colored solutions in the lab. Assigning a person to measure flavors in small bottles for the candy maker is a small task that can reduce flavor cost at least 25%.

Extending Shelf-Life Of Finished Foods

According to H. B. Coaler, Quartermaster Food & Container Institute, Chicago, coconut bars can be made which, in enclosed containers, remain stable for nine months at 100 deg. F. and for a year at 70 deg. F. Bars also can be made that will remain stable for one year when stored in loosely covered boxes at room temperatures.

When high quality coconut is used, a stable bar can be produced. Addition of antioxidant is unnecessary.

There is no apparent benefit in adding a combination of glycerine and sorbitol when bars are kept in sealed packages. Hydrolysis does not appear to be a problem. When storage is in loosely-covered boxes, addition of a combination of glycerine and sorbitol was of definite benefit in extending shelf life due to moisture retention.

Enzymatic action did not appear to occur in coconut bars, since there was no difference between the hot and cold batches.

Antioxidants

V. N. Stuckey, Eastman Chemical Products, Inc., Kingsport, Tenn., pointed out that rancidity in nut candies can be inhibited by the use of phenolic-type food grade antioxidants. Best overall stability was obtained by treating nuts with a synergistic mixture, such as Tenox III (14% BHA, 6% propyl gallate, and 3% citric acid), and the package with .05% BHA (butylated hydroxyanisole). Treating nuts alone with either BHA or Tenox III gave almost equal stability to the nut-and-package-treated combination.

BHA in oil used for frying almonds increased shelf-life, but was not equal to above treatments. Propyl gallate when combined with BHA (Tenox III) gave excellent results. When used alone, it would not be considered satisfactory for this application.

Hard Butter Coatings

About 80% of the answer to retaining gloss in hard butter coatings is obtainable, explained J. J. Alikonis, Paul F. Beich Co., Bloomington, Ill.,

best for food plants

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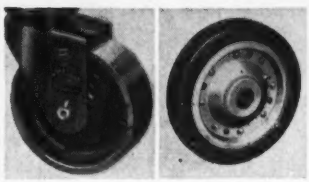

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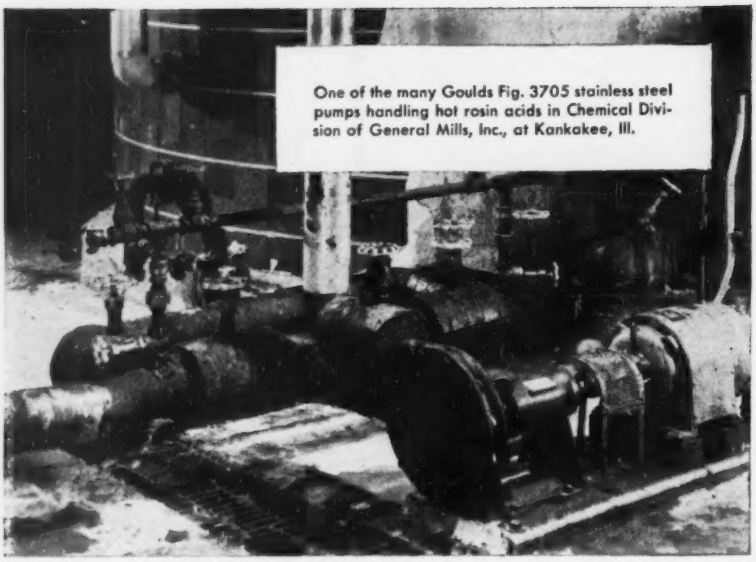


One of the many Goulds Fig. 3705 stainless steel pumps handling hot rosin acids in Chemical Division of General Mills, Inc., at Kankakee, Ill.

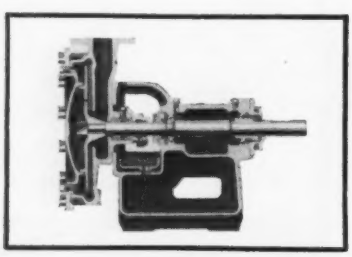
How General Mills solves problem of handling hot rosin acids . . .

The processing of vegetable and animal fats often involves handling such corrosive fluids as hot (270° F.) mixtures of 70% rosin acids.

The Chemical Division of General Mills, Inc., Kankakee, Ill., solves the pumping end of this tough materials handling problem by using more than a score of Goulds Fig. 3705 centrifugal pumps of Type 316 stainless steel.

These pumps are designed for maintenance economy, too. Because it is on the suction side of the impeller, the stuffing box is subject to suction head pressure only. This means long packing life and freedom from excessive leakage. Also, you can inspect and clean the interior, or remove and replace the impeller, without disturbing the piping.

Bulletin 725.3 gives detailed information (including performance data) on this popular Goulds Fig. 3705 pump. We'll be glad to send you a copy.



Cross section of Goulds Fig. 3705 chemical pump shows how design limits pressure on stuffing box to suction pressure only. This pump is available in Nos. 304, 316 and FA-20 stainless steel, in all iron, all bronze, bronze fitted, and all iron or all bronze with stainless steel trim. Capacities to 720 GPM. Heads to 200 ft.

MEMBER HYDRAULIC INSTITUTE U.S.A.

Goulds PUMPS INC. Seneca Falls New York

with a Brabender Plastograph. This instrument checks the viscosity of coatings as they are heated and cooled through various cycles. It has a farinograph that records consistency curve on a graph. Study of the graph gives an insight into actual role of tempering in proper setting of coatings—key to gloss retention.

The other 20% of the answer depends on how the coating is handled. Involved are: (1) Type of equipment, such as melting and cooling kettles and tempering units; (2) use of the seeded-continuous feed method; (3) production schedule and plant supervision; and (4) line up of equipment.

Ingredients other than hard fat can destroy gloss. Contributing are the misuse of lecithin, certain other emulsifiers, and cocoa powder (with a cocoa butter content above 14%).

About 95% of dulling and sticking of "chocolate type" and hard butter coatings is due to mishandling from melting, enrobing, cooling, storing.

Two methods—hot and cold—have been worked out for satisfactorily applying these coatings. As for the hot method, 102-deg.-F-melt hard fat coating is tempered in batch kettles or fed through a tempering column or a Bloomer tube, in which they are fed to enrober at 90 F. Enrober temperature is raised to 95-96 F. for coating goods.

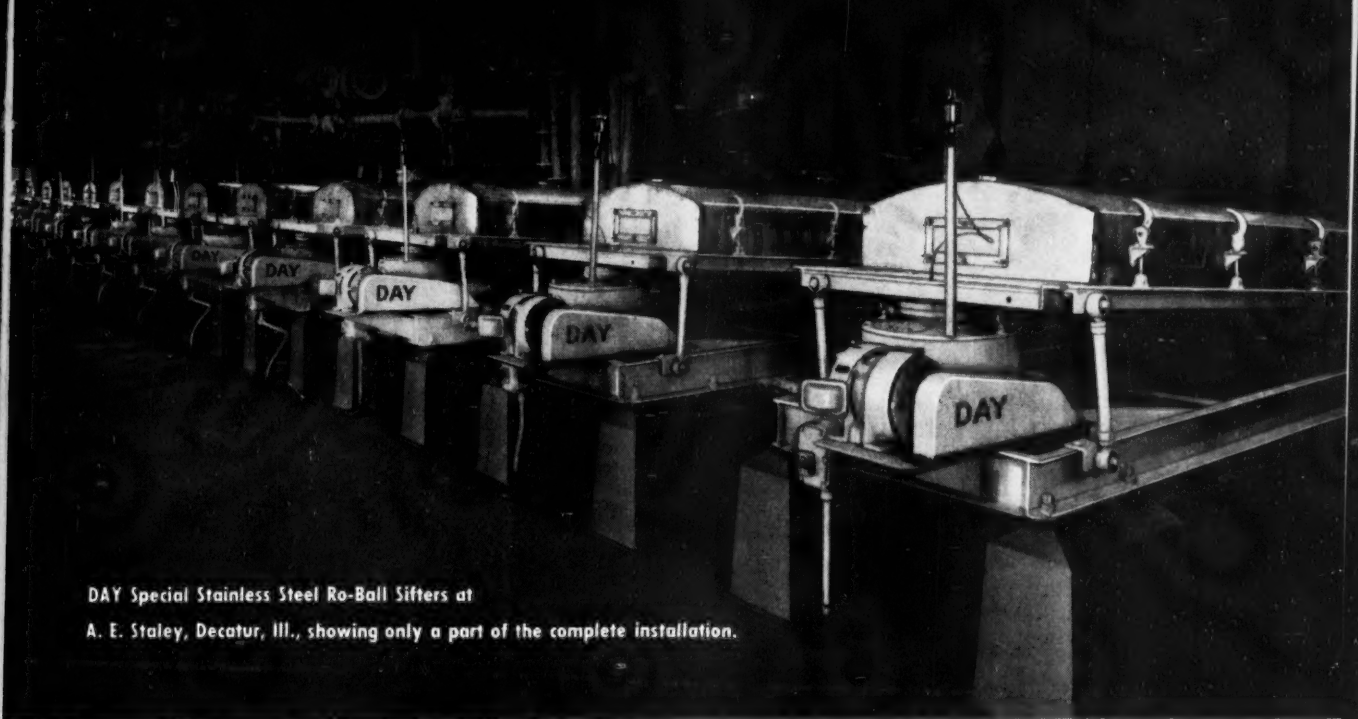
Cold processing involves seeding a portion of the coating, within 12 hr. and at 70 F., in a small revolving kettle with 14-rpm. agitator speed. Enrober then is filled and temperature of coating is lowered until it thickens (at 90 F. or below). About 5% of the seed is added to enrober at this point. Then a continuous stream of coating is introduced at 101 F., and enrober constantly is cooled to maintain about a 95-deg.-F. enrobing temperature. Coating is cut-back in a pencil stream with this technique.

Tunnel temperatures are important. In winter, when equipment may be cold, it is best to enrobe 10 F. higher than temperature in the tunnel. In warm weather, tunnel temperature should be about the same as for enrobing regular chocolate goods. A fuzzy gray or fingerprint mark on goods shortly after they enrobed is an indication that tunnel temperatures are too cold.

In storing coated goods, it takes two to three times as long for the coating to go completely into the solid phase as with chocolate goods. It is important, therefore, to store goods in not too cold a temperature for longer periods. The time will depend on amount of seed in enrober and amount of molten coating after goods leave the tunnel.

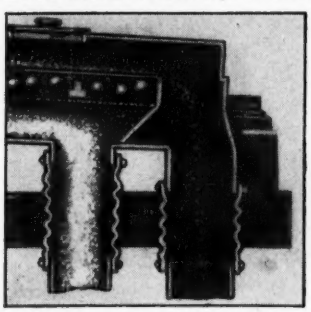
End (*Resume reading on page 69*)

DAY means longer life span



DAY Special Stainless Steel Ro-Ball Sifters at
A. E. Staley, Decatur, Ill., showing only a part of the complete installation.

✻ Extra long life for your equipment is assured by DAY's unmatched ability to combine rugged construction with precision engineering. An impressive list of users have found this true of the DAY Ro-Ball Sifter, which accomplishes 100% elimination of foreign material and ideal aeration. Key to its outstanding performance is the Super-Active Ball Cleaning Device. Scores of rebound points are provided in each compartment, resulting in even vibration over the entire screen surface. The extremely fine mesh stays clean and open, allowing free passage without crushing or forcing



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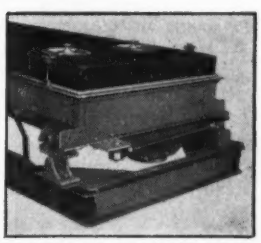
Dust-proof Inspection Ports, with cast aluminum rim and cover, are precision-fitted. For complete information on these and many other features — including self-aligning tail end bearings, stabilizing drag link, and stabilizer to prevent rocking—simply call your nearest J. H. Day field engineer or write us direct for Bulletin.



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NEW PACKAGES & PRODUCTS

OVERWRAPPED with precut pliofilm by two women on opposite sides of the conveyor, poultry is heat sealed before being inspected.

POLYETHYLENE is the packaging material in this Petit Poultry line. Women wrap parts with poly', then insert them in heat sealer.

Plastic Packages for Poultry Parts

Two simple, but fast wrapping lines speed poultry packaging

Speedy and accurate overwrapping of poultry parts packed in a tray is possible with packaging lines now in use for Petit's Clean-N-Tender line, and Swift's Premium Tender-Grown brand.

The Swift line uses Goodyear 120-hm Pliofilm, featuring high tear and puncture resistance and good temperature flexibility. The material is pre-cut from rolls and used in sheet form.

Removed from cooling tanks just before packing, the parts are packed in only a few minutes, adding to freshness and flavor.

Placed in paper trays and weighed, the parts are taken from the conveyor by two women, one on either side of the belt. These operators take the filled trays, place them on a table and wrap them loosely with Pliofilm, then return them to the conveyor. As the package moves on, steel arms press the ends down and under the tray. The tight package is then heat sealed.

Machines used are manufactured by Pack-Rite.

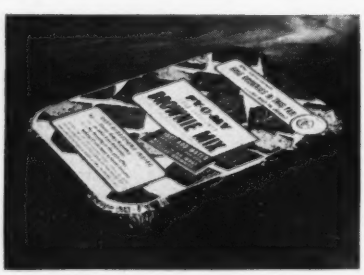
Benefits of the system are quoted as being that the poultry requires no freezing, and the Pliofilm provides a tight, odorless seal.

Slightly less automatic, but just as simple and speedy is the wrapping method employed by George I. Petit Poultry, Inc., Doylestown, O. Using Shellene polyethylene manufactured by Shellmar-Betner Div., Continental Can Co., the system is inexpensive and easy to install.

Operators pull perforated sheets of the material from a roll, wrap the trayed parts, heatseal the package and replace it on the conveyor. The heat sealer is manufactured by Great Lakes Stamp & Mfg., Co.

The polyethylene wrappers may be printed in color, and offer temperature flexibility and durability. The sheets are stretch-wrapped in close contact with the chicken and the tray, eliminating the need for retail rewrapping.

For Package Data Use Reader Service, p. 181



Foil Advantages Spur Extra-Features

Use of foil containers for baking and heating has lead to two novel applications of the aluminum foil package. Kitchen Art Foods, Inc., Chicago, is processing its Py-O-My Brownie Mix in a rectangular pan that may be used for baking the cookies after they are mixed. A chipboard label is held over the pan by flanges, and features an illustration of the

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AN EXPLANATION

In answer to increased interest in a recently inaugurated procedure for conducting "on-the-spot" demonstrations of air-flotation equipment, we are pleased to make the following explanation.

The advent of our lab-size Whippet V-80 Separator makes it possible to establish, in your own plant and at your convenience, accurate forecasts of results which will be obtained from the identical process under full-scale operating conditions.

Such a demonstration may be of invaluable aid to that phase of your research program which involves the economy of operations and the quality of raw or end products. Perhaps the V-80 will indicate an immediate usefulness. Seeing is believing.

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DEPT. F-654

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cookies with directions for preparation.

E-Z Pop is utilizing a circular foil pan fitted with a fold-up cardboard handle, for its ready-to-make popcorn. Expanding with the popping corn, the container will hold a gallon of popcorn. The combination pan-package was designed by Benjamin W. Colman of Pakko Laboratories, Inc., Detroit.

Blended Fruit Juice

FR-8, a blend of grapefruit, orange, peach, apricot, banana, apple, lemon, and lime juice, is being processed by Campbell Soup Co., Camden, N. J. Possessing a tart, refreshing flavor, the blend offers the advantage of both vitamin C and A and is low in calories.

Highlighting the 12 and 46-oz cans is a colorful and attractive label. A departure from Campbells "family" of labels, the FR-8 can is circled with a band divided into squares, each square holding a full-color reproduction of one of the fruits whose juices are blended in the product. A yellow panel on the front of the can features the name, with the word "new" prominently displayed. The yellow back panel contains information on content and preparation.

The product is being test marketed in Dayton, O., and Syracuse, N. Y.

Spoon Becomes Trademark

A colorful red spoon is to be used to identify Gold Metal flour and all General Mills cake mixes as members of the Betty Crocker food family.

Part of the processors plan to make easy identification of the line possible, the spoon was accepted as a natural tie-in with the kitchen. The brand name, Betty Crocker, appears in white against the bowl of the spoon, the elongated handle extends around the package as a border relief.

The Gold Metal flour sack is the first to carry the symbol. Copy and lettering on the label have also undergone revision.

Mother's Little Helper

Designed as a novel toy for children, but also serving the important merchandising task of bringing samples of Betty Crocker mixes into the home is a Junior Baking Kit manufactured by Ideal Toy Co., New York.

Complete with mixing bowl, cookie sheet, muffin pan, pie pans, and all the equipment necessary to turn out cakes and pastry on a miniature scale, the kit also has packages of Betty Crocker cake mixes, frosting, pie crust, and cookie mix. A Betty Crocker junior baking book is packed in the attractive carton, along with a "letter to mother" from Betty Crocker.

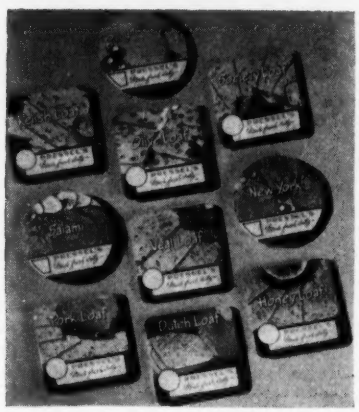
Paraffin Preserves Pickles

Green Bay Food Co., Green Bay, Wis., is protecting its dill pickles in a novel and thorough way. The garlic-flavored pickles are dipped in a protective wax coating that not only keeps the product fresh, but prevents odors from escaping. The wax coating requires only a band with product identification to complete its package

Canned Oysters Debut

Frozen Ballard-brand fresh oysters have been introduced in vacuum-packed cans manufactured by American Can Co. The hermetically sealed can and vacuum protect the oysters against deterioration and dehydration effects. Lithographed in five colors, the 12-oz. cans are stamped with the grade of oysters they contain.

For Package Data Use Reader Service, p. 181

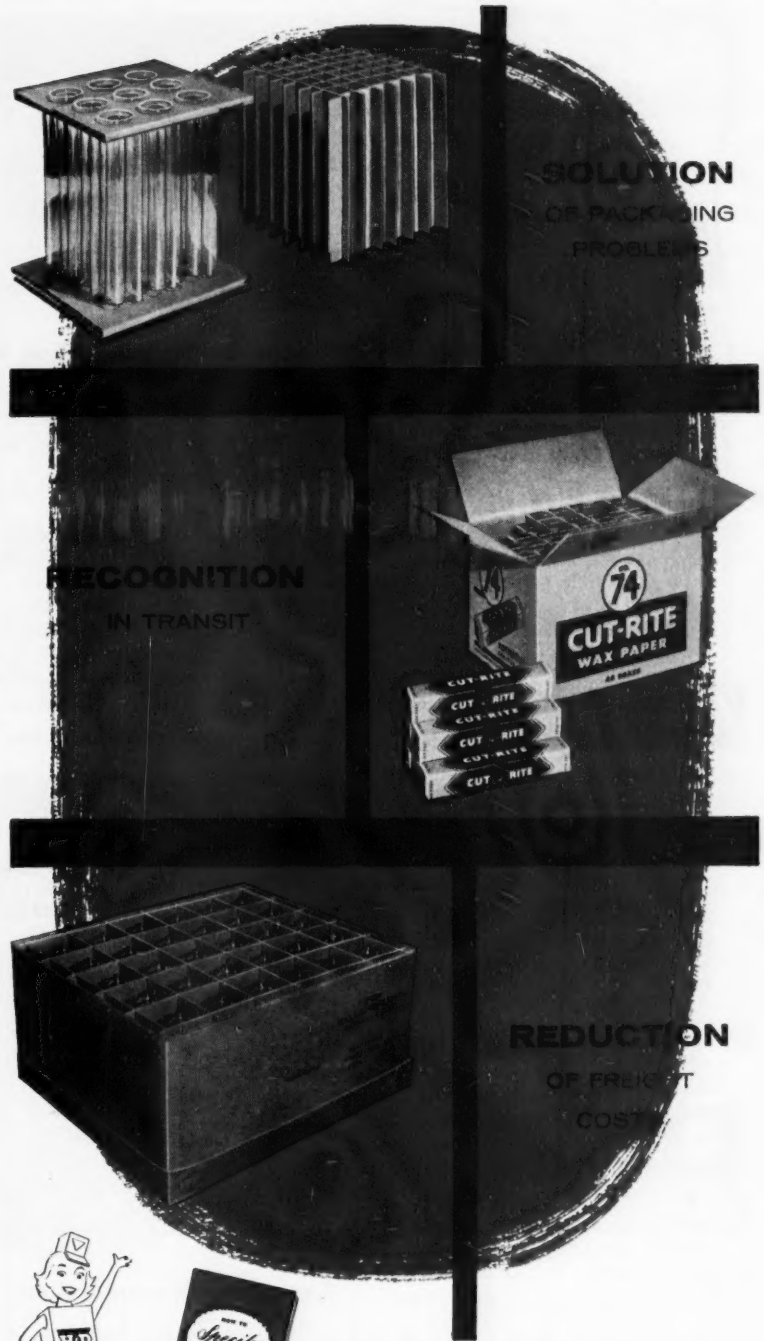


Luncheon Meat Labels

Designed by Milprint, Inc., Milwaukee, for R. R. Pressel Sausage Co., Detroit, for their line of luncheon meats are a series of ten different cardboard backings. Directed at stimulating sight sales in supermarkets, the lithographed cards feature full color reproductions of the meats, with space for price and brand name. The backings eliminate the need for application of label and bottom boards.

Waxed on both sides, the cards are placed on one side of the meat, picture side out, then overwrapped with cello'.

For Package Data Use Reader Service, p. 181



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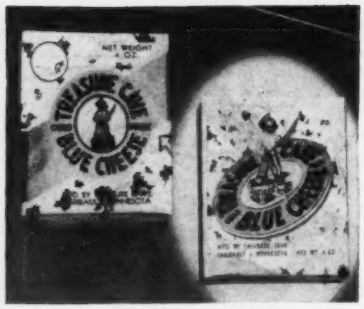

Processors Switch to Foil Wraps

Sold on the advantages of foil over glassine, and aniline, three processors have turned to foil for better sales appeal.

Treasure Cave Co., Faribault, Minn., has replaced its aniline wrap for a line of blue cheese, with a gravure printed foil wrapper. The wrap features a reproduction of the cheese, with the remainder of the surface in bright gold to simulate the wax covering the cheese. A large silver coin in the center of the package is printed with brand identification and trademark, a pirate straddling a treasure chest.

The processor believes that the new wrap will stimulate impulse buying and instant brand identification.

Paine & Co., Los Angles, formerly marketed its Shoe String potatoes in a waxed glassine bag. Now the product is merchandised in a foil bag of silver, red, green, and yellow. A reproduction of a smoke house emphasizes the "hickory-smoked" angle.

Both new foil designs are by Milprint Inc., Milwaukee.

For Package Data Use Reader Service, p. 181

Chocolate-Flavored Gum

Reported as the first time that chocolate favor has been successfully captured in chewing gum, Choc'm is being produced by Frank H. Fleer Corp., Philadelphia. The result of sixteen years of research by Fleer, the product is packaged in waxed paper in small one cent pieces. Ingredients consist of gum base, sugar, corn syrup, cocoa, malt, and some artificial flavoring.

The pieces are displayed in a colorful carton made by Robert Gair Co., New York.

For Package Data Use Reader Service, p. 181

Fresh-Frozen Sausage Meat

Debuting in an aluminum wrapper specially designed by Reynolds Aluminum Co., is a frozen sausage meat product processed by Deerfoot Farms Co., Southborough, Mass. The fresh-frozen meat is convenient in that it requires no thawing before cooking by consumer.

The wrapper for the 1-1b. carton is red with white lettering. The aluminum acts as an insulator and protects the meat from freezer burns, as well as prolonging life and freshness of the sausage.

Cartons Replace Cans

Circus Corp., Miami, in switching from cans to single service cartons, has incorporated advanced design features in the packaging of their line of fruit drinks. Each flavor is identified by carton color—orange, grapefruit, and pink elephant. Though no two panels

are alike, brand identification is possible through carry-through of the circus motif. One panel is devoted to premium data, while the top carton tab serves as a coupon when removed.

Switchover to the cartons was brought about by housewife preference, war restrictions on use of metal, and better merchandising facilities.

Beefy Bacon

Armour and Company has introduced a new smoked beef product under the Armour Star label, called Cured and Sliced Breakfast Beef. Closely resembling standard sliced bacon in appearance, the product is made from a portion of the beef plate. The meat is boned, trimmed, cured, smoked, sliced, and wrapped in 1-lb. cellophane packages for self-service retailing.

Each package contains from 18 to 22 slices. Package is of chipboard overwrapped with printed cellophane, with high product visibility. Instructions for preparation are included on the package.

The beef bacon is directed at consumers who prefer a leaner breakfast meat than bacon, or who prefer beef to pork.

Tests have indicated that the beef package retains its color well under refrigerated display.

New Product Shorts

Meat for Baby

Strained meats packed in glass jars is the latest addition to the H. J. Heinz Co. line of baby foods.

Bottled Kraut

Lady's Choice, Hayward, Calif., is packaging fresh sauerkraut in vacuum packed, 24-oz. bottles.

Small-Family Ham

A new 4-lb. pear-shaped canned ham is being marketed by Armour and Company. Designed to meet needs of the small family, ham provides retailers with a fast-turnover, relatively low-cost unit.

Another Canned Pie

Following the success of their canned beef pot pie, Trenton Foods, Inc., Kansas City, has introduced its Dinner Time Chicken Pot Pie, in the same pie-pan shaped can.

Laying it on Thick

Klarer Provision Co., Louisville, is marketing "Hillbilly Bacon" smoked three times as longer bacon, and sliced thicker than conventional bacon.

Offers Frozen Soups

Campbell Soup Co. has added four varieties of frozen soups to their famous line. Oyster stew, cream of shrimp, chicken vegetable, and green pea with ham, are packed in 10½-oz. cans.

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ADVANCES IN TECHNOLOGY

Fatty Acid Contents of Processed Foods Following Various Types of Treatments

Increasing significance of role of fat in the diet, and fact that most fat analyses have been made on samples of unprocessed raw foods, suggested a program of determining fatty acid contents of foods which had undergone various types and degrees of processing.

In one study, fatty acid constituents were determined on two cheeses, four cured meats, two hydrogenated oils.

In another experiment, foods were analyzed that had undergone relatively mild processing, such as rolled oats, whole white corn meal, roasted peanuts, peanut butter, and walnuts. Also included in this study were Crisco shortening and raw peanuts.

Because the acids under consideration are highly unsaturated and, therefore, subject to possible alteration or destruction by oxygen, chemicals, or heat, effects of ordinary processing or cooking of fat-containing foods are significant in human nutrition.

Two sets of data were obtained for each sample: (1). A small portion of fat was converted into fatty acids and these were analyzed spectrophotometrically for polyunsaturated components; (2). A second portion was converted to methyl esters by methanolysis except in the case of cheese fats.

Fatty acids of the latter were esterified by special techniques, and in all cases the total methyl esters were fractionated in one distillation without separation of saturated and unsaturated portions. Details of preparation and analysis of samples are given in the original article. Results are contained in Table below.

Digest from "Fatty Acid Contents of Certain Processed Foods," and "Fatty Acid Contents of Several Food Products," by C. Willard, R. D. Englert, and L. M. Richards, *Journal of the American Oil Chemists' Society*, 131-135, April, 1954.

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FATTY ACID CONSTITUENTS of Foods in Percent

Foods	Total Fat	Saturated						Unsaturated				
		C_{12}	C_{14}	C_{16}	C_{18}	C_{20} and Above	Total	Monoene	Diene	Triene	Tetraene	Total
Bacon	59.45	0.06	0.59	12.3	5.5	0.37	18.8(2)	31.63	5.82	0.32	0.24	38.0(1)
Cheese, American [1]	30.75	0.72	3.1	7.6	3.4	0.51	17.6(4)	10.37	0.75	0.25	0.05	11.4(2)
Cheese, Swiss [2]	26.14	0.61	2.7	6.3	3.1	0.14	14.8(3)	9.08	0.58	0.18	0.03	9.8(7)
Frankfurters	33.05	0.03	0.34	7.9	3.6	0.09	11.9(6)	16.72	2.64	0.19	0.09	19.6(4)
Ham	25.11	0.11	0.42	5.2	3.3	0.09	9.1(2)	12.23	2.40	0.16	0.10	14.8(9)
Luncheon Meat	20.37	0.04	0.14	4.95	1.82	0.24	7.1(9)	10.62	1.55	0.03	0.08	12.2(8)
"MFB" Shortening	99.93	....	0.99	13.2	6.67	3.11	23.9(7)	61.29	10.19	0.08	....	71.5(6)
Oleomargarine	80.64	....	0.42	17.0	2.14	1.44	21.0(0)	42.47	13.57	0.05	....	66.0(9)
Cornmeal	3.77	....	....	0.33	0.05	0.07	0.4(5)	1.39	1.74	0.02	....	3.1(5)
Crisco	100.00	....	0.56	14.1	6.3	1.62	22.5(8)	61.18	11.64	0.20	....	73.0(2)
Peanut Butter	51.65	....	0.54	5.84	2.9	4.0	13.2(8)	18.8	17.3	....	....	36.1(0)
Raw Peanuts	50.25	....	0.5	5.9	3.3	5.0	14.7(0)	17.4	15.94	....	....	33.3(4)
Roasted Peanuts	51.30	....	0.4	5.9	2.3	2.8	11.4(0)	21.8	15.84	....	....	37.6(4)
Rolled Oats	5.92	....	0.02	0.76	0.24	0.26	1.2(8)	1.88	2.42	0.07	0.01 [3]	4.3(8)
Walnuts	66.80	....	0.29	3.49	1.86	....	5.6(4)	10.63	38.90	8.66	0.03 [3]	58.1(6)

Controlling Breakdown Of Deep Frying Fats

Changes in fats used for deep frying may be restricted by maintenance of certain conditions during the operation.

Among these are: (1) Rapid rate of fat turnover; (2) No prolonged heating without compensating turnover; (3) Non-aeration during circulation through heat exchangers, filters, frying equipment, or by "cascading" of hot fat into holding tanks; (4) Avoidance of intense heat input in attempt to secure additional frying capacity; (5) Removal of improperly designed heating elements that produce intensely heated focal points; (6) No contamination through drip back from exhaust vents; or from "feed-back" of old or spent fat; (7) Control of chemical contamination from products being fried, and of food fragments, and (8) No contamination with cleaning and filtering compounds.

Digest from "Some Factors Affecting Decomposition of Frying Fats," by G. T. Carlin, R. P. Hopper and B. N. Rockwood, *Food Technology*, 161-65, March, 1954.

Nomographs For Use With Oils and Fats

Use of alignment charts in the field of oils and fats is comparatively rare. So attention should be directed to 3 that have recently been published. They bring up to 8 the number of such charts useful in routine calculations in this field. With introduction of spectroscopic methods in fat analysis, more reliance is being placed on ultraviolet absorption data than on the purely chemical methods like thiocyanogen- and insoluble bromide-value for accurate determinations of linolenic and linoleic acids.

Relationship between fatty acid composition, ultraviolet absorption data, and iodine value is amenable to a plot on an alignment chart. Charts have been devised for the determination of percentage of fatty acid composition in a fatty acid mixture on the basis of:

1(A). Extinction coefficients at 233 millimicrons and iodine values,

1(B). Iodine values and thio-

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Continuous Power Conveyors *are tops!*

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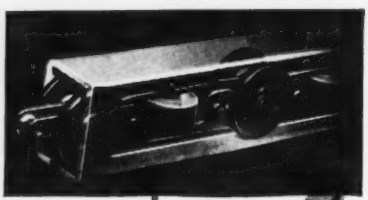
VERSATILITY—ZIG-ZAG is installed overhead, out of the way of production. Six-inch pendant centers make it easily adaptable to a variety of handling jobs. It carries materials up, down, in, out and around, "like water through a pipe."

FLEXIBILITY—When changing production conditions require alteration, ZIG-ZAG Conveyors may be relocated by plant personnel, in many cases using all the parts.



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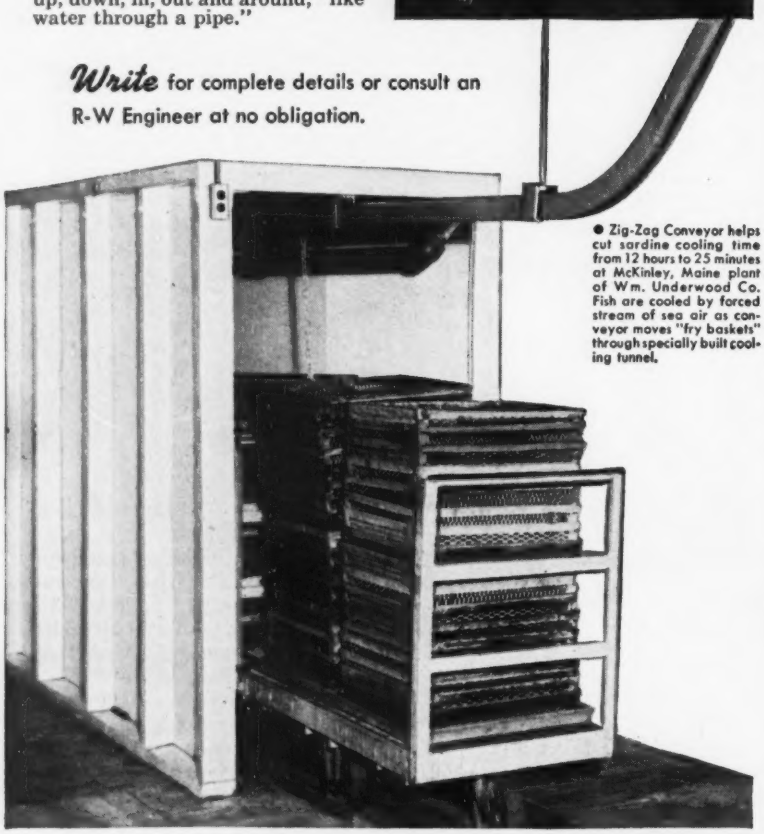

● Zig-Zag Conveyor helps cut sardine cooling time from 12 hours to 25 minutes at McKinley, Maine plant of Wm. Underwood Co. Fish are cooled by forced stream of sea air as conveyor moves "fry baskets" through specially built cooling tunnel.

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cyanogen values when linolenic acid is absent, and

2. Extinction coefficients at 268 and 233 millimicrons and iodine values when linolenic acid is present.

In first two charts triangular coordinates are used to give directly the ternary fatty acid composition. Authors believe that use of triangular diagrams in nomography marks a radical departure from usual rectangular structure of alignment charts.

Digest from "Nomographs for Calculating the Fatty Acid Composition of Oils and Fats From Iodine Values and Either Extinction Coefficients or Thiocyanogen Values," by K. Ananth Narayan and B. S. Kulkarni, *Journal of the American Oil Chemists' Society*, 137-142, April, 1954.

FISH & MEATS

Effect of Heat and Smoking On Bacteria in Bacon

Smoke constituents are chiefly responsible for the bacterial reduction during smoking of bacon. But temperature contributes to their effectiveness, especially in the case of light smoking.

A study was conducted to evaluate the roles of chemicals in smoke; elevated temperature, and drying action in destruction of bacteria during smoking of pickled-cured pork bellies. They were subjected to light and heavy smoke for 4-7 hr. under the following conditions: (1) high temperature, high (50-100%) humidity; (2) high temperature, low (17-24%) humidity, and (3) low temperature and high humidity.

Light smoke caused little bacterial reduction below 90 F., while heavy smoke produced significant reductions at 55 F. At 140 F. both light and heavy smoke reduced bacterial counts to 0.01% of initial value. Humidity had little or no effect on bacteria, but low humidities and high temperatures resulted in an average weight loss of 8.3% in 7 hr.

Digest from "Bactericidal and Drying Effects of Smoking on Bacon," by N. E. Gibbons, D. Rose and J. W. Hopkins, *Food Technology*. 155-57, March, 1954.

Salt In Brine-Frozen Fish

Frozen salmon held for approximately 2 weeks in brine at 5 F., then thawed in running water carry less than 0.5% salt. This can easily be compensated for by decreasing the amount of salt added during canning.

Bristol Bay red salmon that had been frozen in 5 F. brine, then held in dry storage at 5 F. until unloaded in Seattle, were divided into 3 groups

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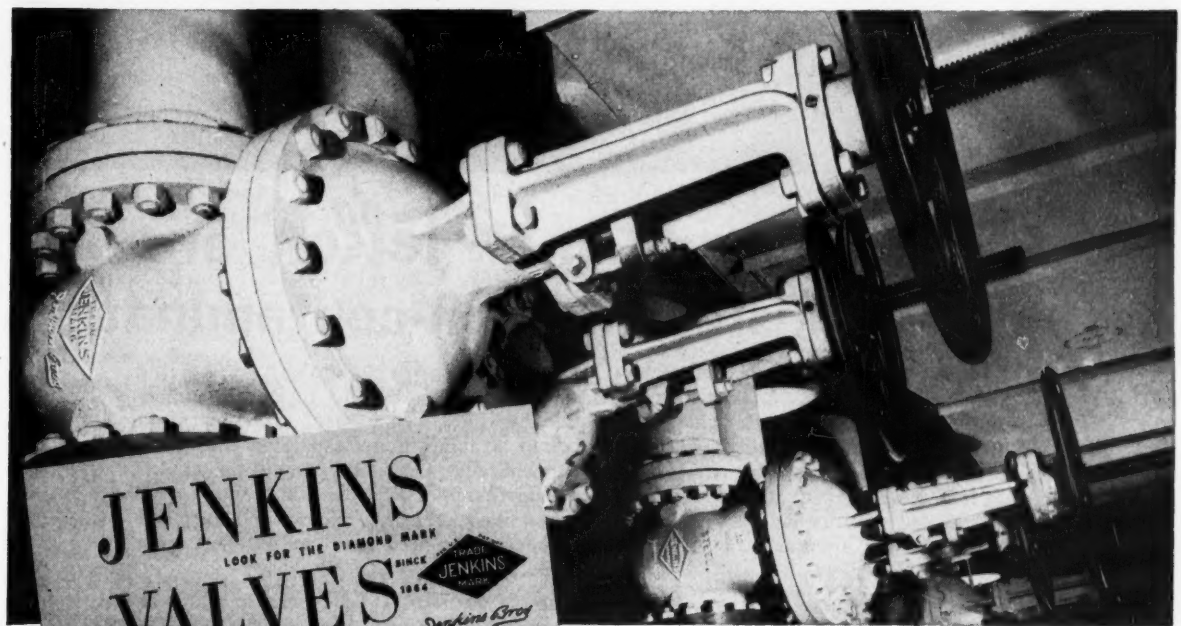

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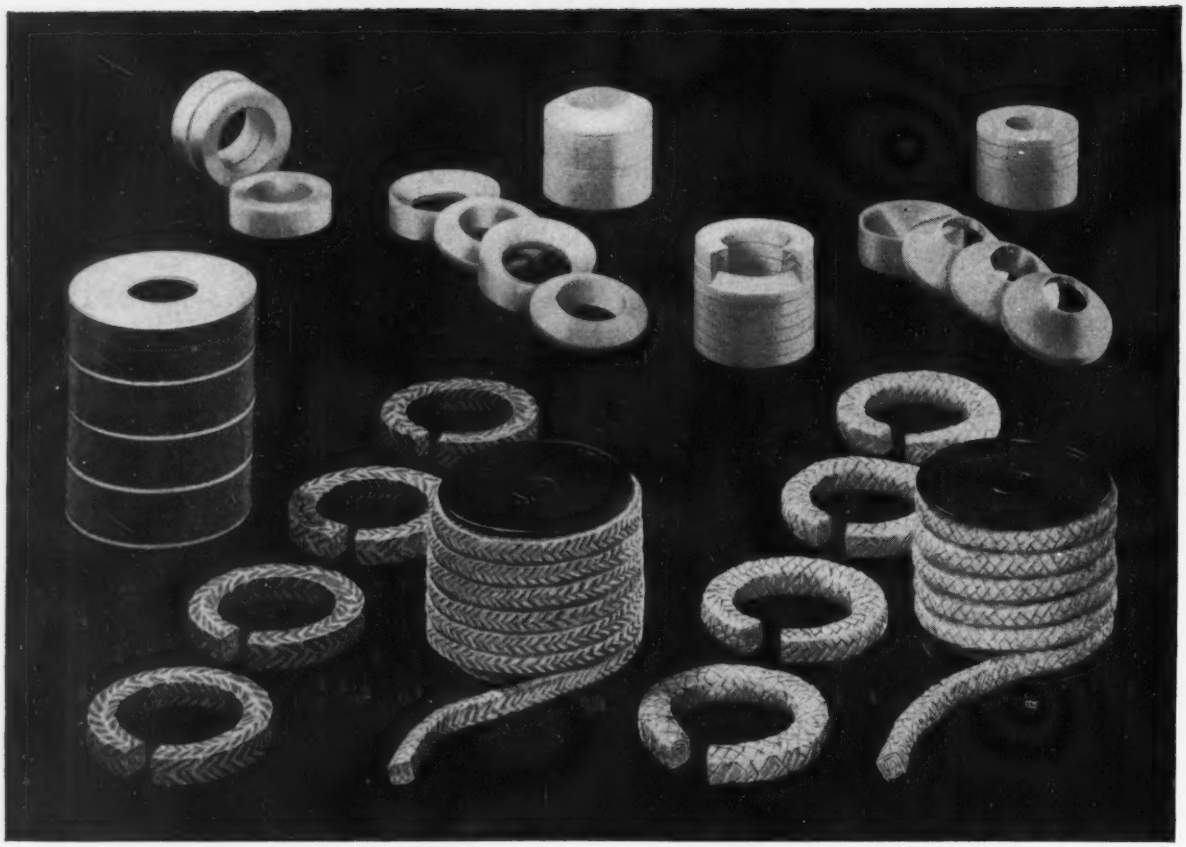

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and thawed in: Running water; still water, and still air. They were then butchered, cleaned, sliced and packed in ½ lb. cans. Cans of running water thawed fish received four 10 gr. salt tablets. The others 3 tablets.

Cans were vacuum sealed, retorted 90 min. at 240 F., cooled in air and stored for several months. Samples were then compared with commercially canned fresh salmon containing 0.125 oz. salt.

No difference in saltiness could be detected by taste, and actual salt contents varied less than 0.1%

In a second test, chum salmon were frozen in 5 F. brine and held in the brine for 2 weeks on a freezership then thawed in running water and canned without added salt. When analyzed, salt content averaged 0.49%.

Digest from "Salt Content of Salmon Canned From Brine-Frozen Fish," by D. T. Miyauchi and M. Heerdt, Jr., *Commercial Fisheries Review*, 8-10, Jan. 1954.

BAKING

Gas Production Accelerated By Many Ground Spices

At low levels, most spices accelerate gas production in simple yeast-sugar suspensions, media containing flour, yeast food, thiamine, amino acids and inorganic salts, and sweet dough formulas containing no shortening.

Mustard, and mustard flour at all levels, and cinnamon at high levels retarded gas production, and mustard flour strongly inhibited yeast growth.

The gas promoting factor remained in spices after ether extraction, autoclaving, ethylene oxide treatment, and prolonged boiling, but was not found in the ash.

The enhanced gas production was not due to accelerated yeast cell proliferation.

Digest from "The Effect of Spices on Yeast Fermentation," by W. J. Wright, C. W. Bice and J. M. Fogelberg, *Cereal Chemistry*, 100-12, March, 1954.

Improved Bread Doughs With Glycerinated Fats

Glycerinated fats may exert improving action on bread doughs by: (1) More efficient dispersion than triglycerides; (2) maintaining soluble starch within starch granules; (3) depressing swelling power of starch gels so they do not change rapidly (stale) with age, and (4) increasing gluten swelling through moisture that would otherwise be used for starch swelling.

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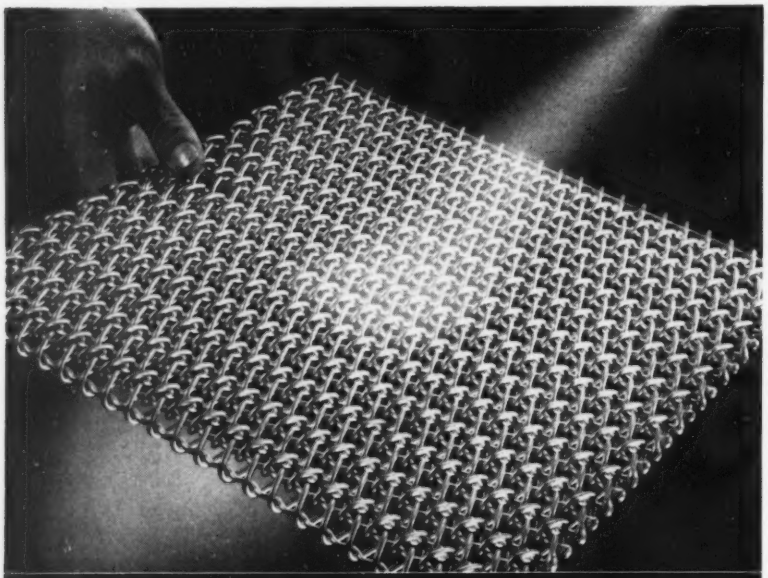

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a softer bread and a longer-keeping crumb. Flour quality, nature of flour oil, fermentation, baking, and bread-cooling methods also have a part in final bread properties.

Self-emulsifying glycerinated fats were superior to non-self-emulsifying types in doughs made with 85% extraction flour. Optimum effect was obtained by using a 25-40% glyceryl monostearate product at 0.3% of flour weight. Glyceryl stearate was superior to oleate or other unsaturated fatty acid derivatives.

In cake batters the improving effect can hardly be due to action of the monoglycerides on the starch-gluten-water system, but must be exerted directly on the shortening powers of the fat and on the physical properties of the crumb. Saturated types of glycerides are superior to the unsaturated for sponge cake batter. Unsaturated glycerides of high iodine number reduced foaming during mixing of batter and lead to coarser texture without increase of softness. For Madeira cakes the unsaturated types were superior.

Digest from "The Role of Glycerides in Baking. Part I: The Effects of Added Glycerinated Fats in Bread and Flour Confectionery," by M. A. Cookson and J. B. M. Coppock, *Journal of the Science of Food & Agriculture*, 8-26, Jan. 1954.

DAIRY

Improved Skim Milk Powder Benefits Baking Dough

Preparation of a skim milk powder which improves volume and oven-spring of baking doughs is the object of a recently patented invention.

Process comprises chlorinating low fat (less than 1%) dry milk to destroy sulphydrils, which are blamed for dry milk's effect on volume and oven-spring of doughs. Chlorination is accomplished by subjecting dry milk to an atmosphere of Cl gas or chlorinating compounds—2-6 oz. Cl per 100 lb. powder—at either room or elevated temperature.

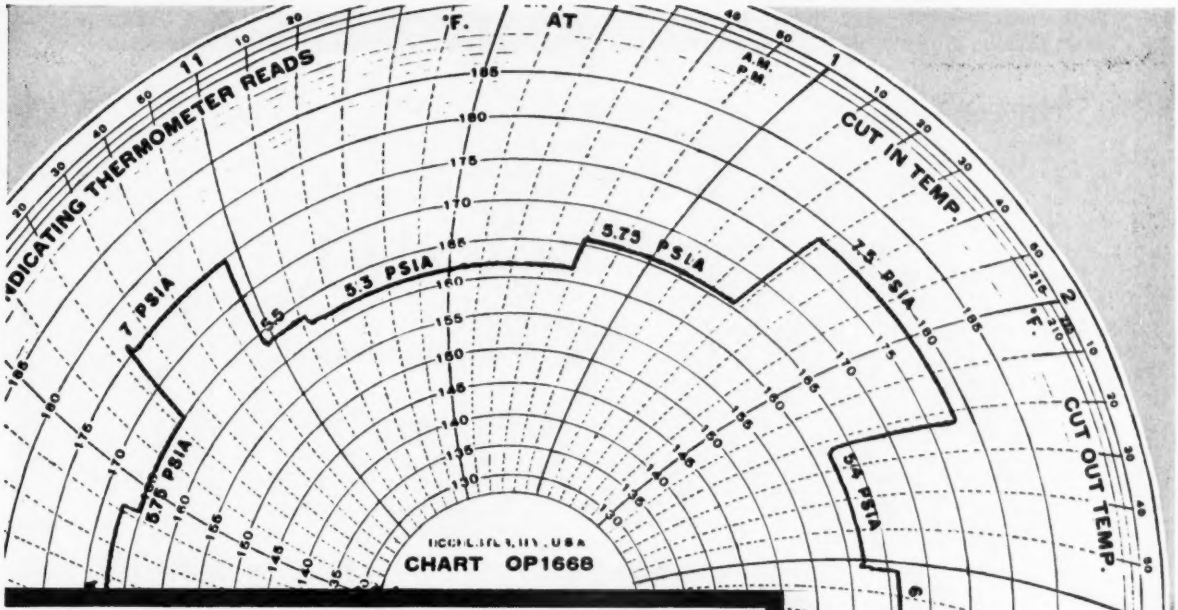
Exposure for 5 min. at 80-85 F. is said to be ample for treating powders containing 3½% moisture.

Digest from U. S. Patent 2,663,643, issued Dec. 22, 1953, on an application dated Dec. 19, 1950, to F. F. Hansen, Pittsburgh, Pa.

High Lactose Whey Powder

A process for manufacture of stabilized, nonhygroscopic whey powder, that readily redisperses in water, by use of one stage drying has been patented.

Liquid whey from cheese or casein manufacture is concentrated under vacuum to 50-60% solids, then slowly cooled (24-36 hr.) with agitation to



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This chart, made under normal operating conditions, shows the temperature of the heated product of a De Laval Plate Heat Exchanger, using the De Laval Vacuum-Steam Heating System, in which temperature is controlled by the amount of vacuum (shown on the chart in psia) applied to the steam in the heating section.

Note these two outstanding features:

(1) The *straightness* of the lines at the various temperatures—lines which, while straight, have "life" in them, indicating the sensitivity of the instruments . . . (2) The *immediate* and *sharp* response to each demand for a temperature change. Quite obviously there is no "seeking" for the correct temperature.

Here is proof that the De Laval Plate Heat Exchanger and the De Laval Vacuum-Steam Heating System, together, provide a simple method for accurate control of product temperature with instant response to any change in operating requirements.

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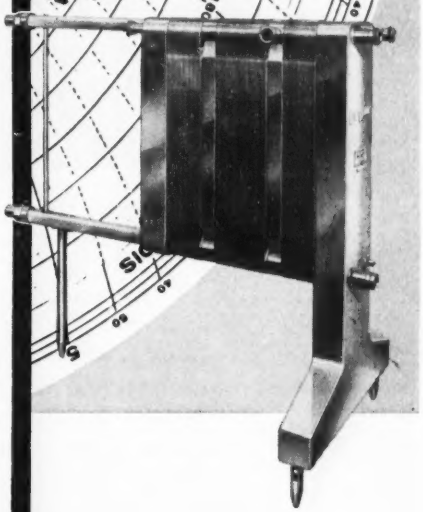

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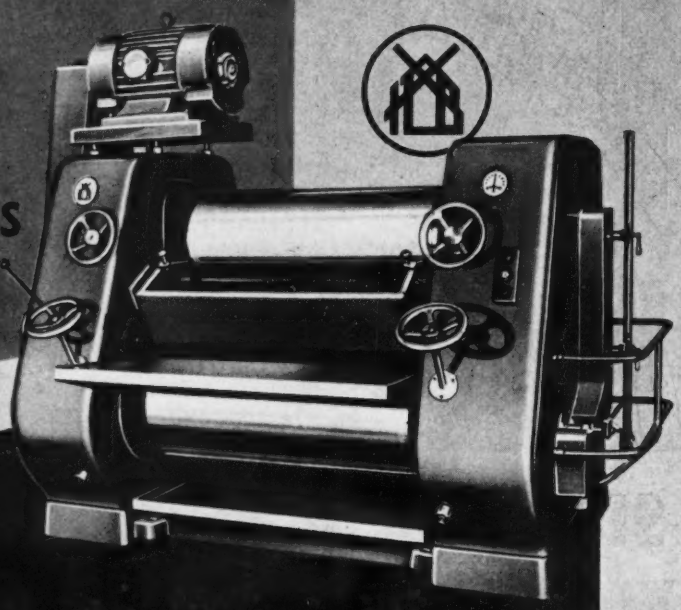

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approximately 25 F. to crystallize at least 50% of the lactose. Crystallization may be speeded by seeding with dried whey powder made by this process.

Slurry is then fed to spray dryer equipped with centrifugal atomizers and dried to about 5% moisture, then bagged for shipment.

A variation of this procedure which results in high lactose powder with reduced mineral salts content employs a centrifuge to concentrate crystals prior to drying. Lactose discharges as an underflow slurry which is fed to spray dryer. A supernatant liquid fraction discharges from overflow of centrifuge. This may be dried separately.

Digest from U. S. Patent 2,661,294, issued Dec. 1, 1953, on an application dated July 9, 1949, to R. E. Meade, Appleton, Wis., assigned to Western Condensing Co., San Francisco.

FRUITS & VEGETABLES

Preserving Apple Sections

A process for treating apples that is claimed to preserve them indefinitely without deleterious effect on flavor or color has been patented.

In the process, apples are washed, peeled, cored, cut into desired size pieces and bleached with sulfurous acid. Segments are then placed in a basket, immersed in a boiling solution of water, sugar and gelatine, and boiled for 10-30 min. according to size of pieces.

After cooking, apples are drained and cooled to permit jelling. Freezing preserves them indefinitely .

Food may be eaten as a sweet, or used in salads, desserts, pies or pastries.

Digest from U. S. Patent 2,662,824, issued Dec. 15, 1953, on an application dated Oct. 4, 1949, to Mary W. Talbert, Columbia, Mo.

What Produces Astringency In Fruits and Vegetables

Although the sensation is elusive, and probably of complex origin, it is believed that the polyhydroxyphenolic alcohols form the majority of astringent substances in foods. Complete evaluation of the property is likely to be difficult.

Substances having the property of precipitating proteins, such as salts of heavy metals or tannic acid, are conspicuous among those that are astringent in the mouth. Generically the latter may be referred to as tannins, although that does not increase our knowledge or understanding of them.

Mineral acids also precipitate proteins, and it may be possible that

1000 sq. ft. of Filtering Surface

2000 lb. Filter Cake

The largest filter of it's type ever built

Model MCR

60 second opening without disconnecting piping. Available in sizes from 100 to 2000 sq. ft. of filtering area. Filter cake can be removed in a semi-dry state by hand scraping or in some cases merely tapping the plates to let the cake fall into the portable disposal receptical.

One man can handle the complete cleaning operation in ten minutes. One movement of a handle to release head bolts, a flip of a switch and the tank moves back, stopping automatically, exposing the plates in less than 60 seconds. Pipe connections are all in the stationary head, so no disconnecting of piping is required. This gives you the fastest action, time-saving, labor-saving tank opening ever engineered in a filter.

Jet pressure spray tubes can be supplied in this filter for washing off cake or in combination with backwashing when the material filtered and sewer conditions permit this type of cleaning.

Filter tanks can be supplied in mild steel, stainless steel, Hastelloy or other metals to meet requirements.

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Ten exclusive features

1. Large flow volume—large plate area up to 2000 sq. ft. and 1 ton cake.
2. One man fingertip operation.
3. No pipe lines to break in opening filter.
4. Filter seal of plates not broken in cleaning.
5. Self sealing cover gasket.
6. Dry cake disposal or flush down cleaning.
7. No head room required above filter.
8. Complete plate drainage.
9. Uniform precoating.
10. Quick opening cover.

European Plant: Sparkler International Ltd., Prinsengracht 876, Amsterdam, Holland.
Canadian Plant: Sparkler International Ltd., Galt, Ontario, Canada.

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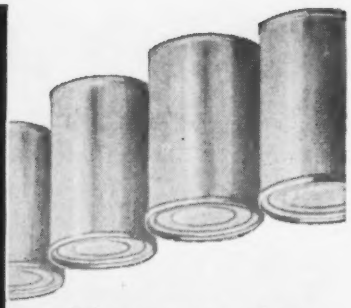

More canners and can manufacturers throughout the world are switching to Angelus Seamers for greater production economies, lower investment costs and minimum maintenance. Angelus Seamers, the products of more than 40 years of experience in developing and manufacturing, are the ultimate in simplified, rugged, efficient design.

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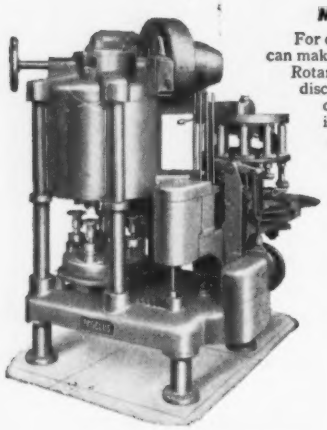
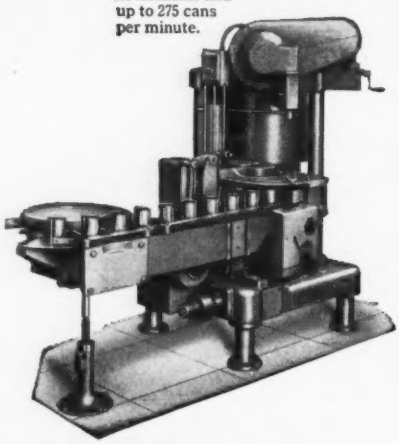


Model 40P-MSLF
With chain feed for can closing only. Automatic Rotary Seamer for round cans 2⅛" to 4¼" in diameter and up to 275 cans per minute.



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In Keeping Up With Field . . . . page 229

sour fruits by virtue of their acidity have astringent action. Among organic compounds, catechins are strongly astringent, as are a closely related class of compounds, leuco-anthocyanins, which are widely distributed throughout the vegetable kingdom. There is a marked similarity between the structures of these compounds.

In bananas and persimmons the tannin responsible for astringency in unripe fruit becomes inactive by becoming insoluble during the ripening process. In apples and pears, catechin, epicatechin and leuco-anthocyanins are known to occur. Grapes and wine, cocoa, and tea all have astringent properties attributable either to tannins or catechins and leuco-anthocyanins.

Digest from "Astringency in Foods," by E. C. Bate-Smith, *FOOD Processing, Packaging, Marketing*, (London), 124-127, April, 1954.

ENGINEERING

Curing Liquid Control

Apparatus has been patented that will automatically perform the operation of injecting into a ham a predetermined quantity of curing liquid.

Invention resides in modifying an ordinary dial-face platform scale by adding electrical mechanism that will automatically open and close valves to control flow of curing liquid into a ham resting on scale platform. Quantity of fluid allowed to flow is a function of weight of ham.

Electrical mechanism is housed behind dial and actuated by it, although not in direct mechanical connection with it. Invention eliminates human factor involved in adding a given percentage of one product to another. It also permits use of existing equipment so that there is no loss by obsolescence.

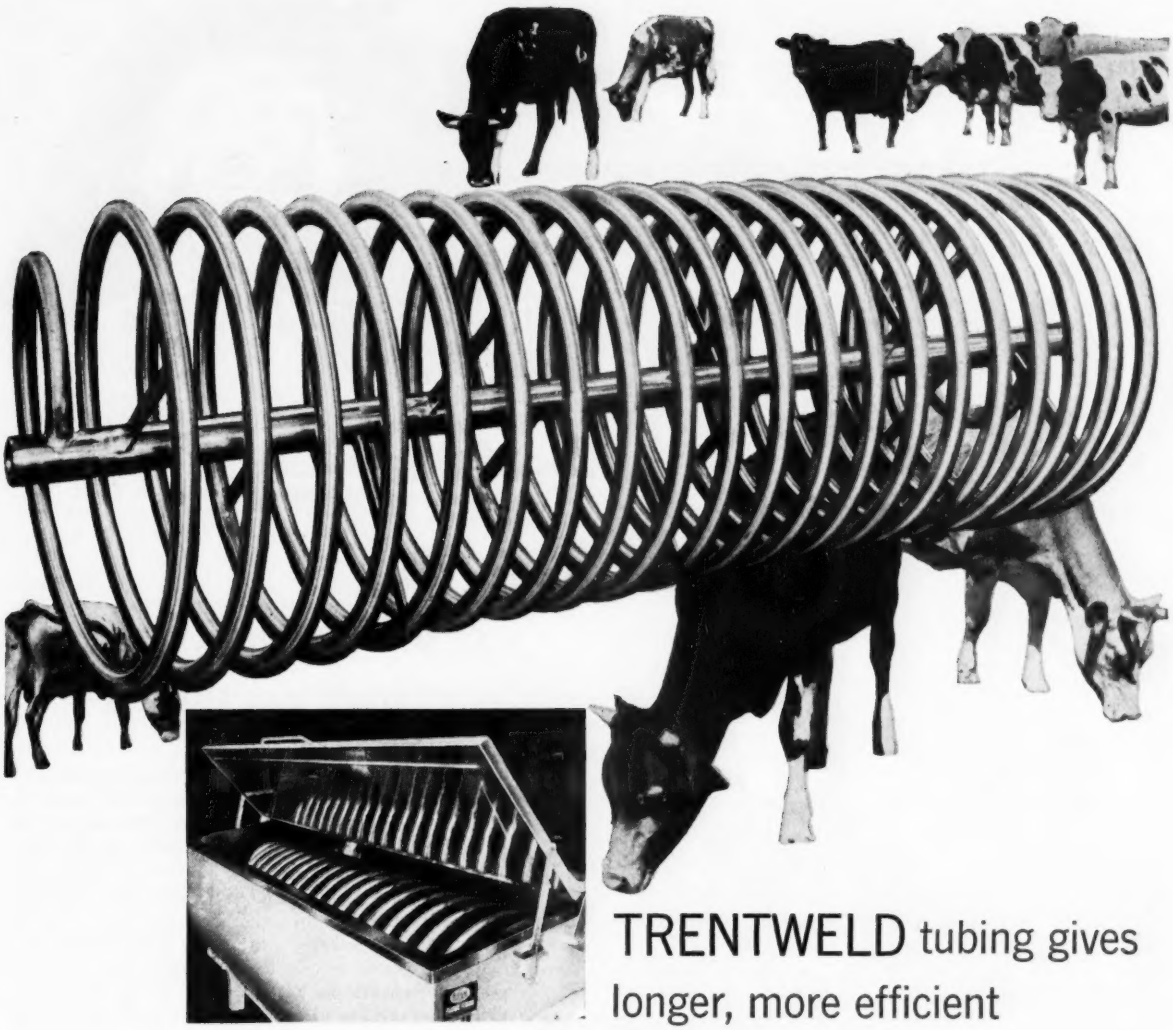
Digest from U. S. Patent 2,663,247, issued Dec. 22, 1953, on an application dated Sept. 2, 1952, to B. T. Hensgen and H. G. Reichel, assigned to Swift & Co., Chicago.

—*End*—

Lime Superconcentrate

—*Continued from page 57*

puree prepared in this manner retains excellent quality for at least one year at 0 deg. F., both as prepared and when mixed with concentrate. Grif-



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The unique OVL-KOIL pasteurizer coil illustrated, is made of TRENTWELD stainless tubing. By forming the coil in an oval shape General Dairy Equipment, Inc., increased its length 10% without any increase in pasteurizer size or sacrifice of space between loops.

This extra coil area speeds up the pasteurization process, increases the efficiency of heating and cooling mediums, and gives greater heat transfer efficiency.

But this is just one of thousands of applications where TRENTWELD tubing has helped make products last longer and operate more efficiently. When you have an application calling for stainless or high-alloy tubing it will pay you to look to TRENTWELD. Trent offers the widest range of tubing sizes and finishes in the industry . . . in standard sizes from ⅛″ to 40″ O.D. – larger sizes on special order. And remember, you just can't buy better tubing than TRENTWELD.

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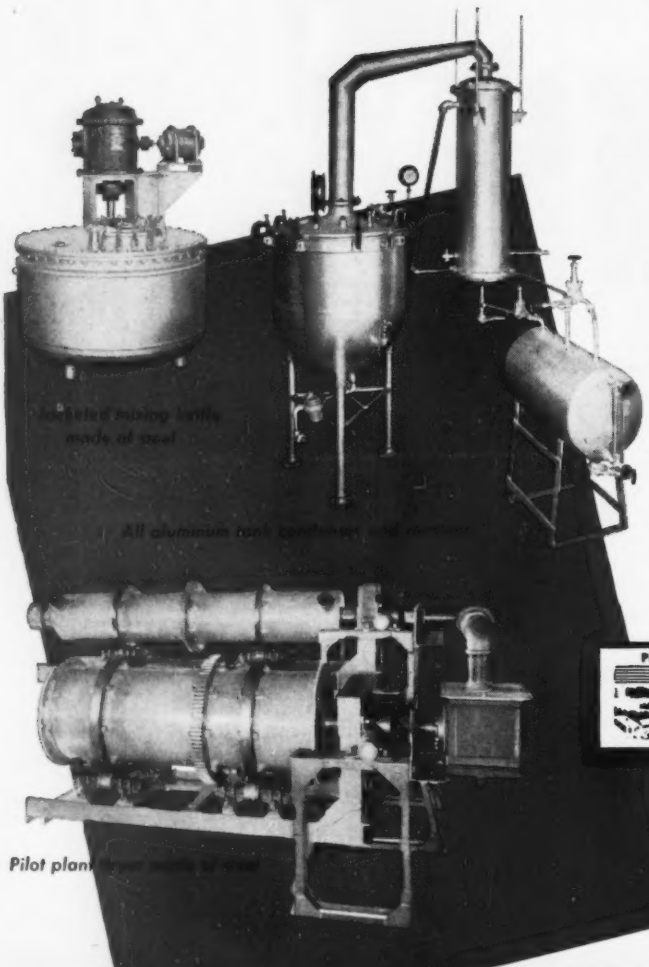

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fiths, *et al*,[4] in preparing limeades from Mexican limes, found that bitterness was related to maturity as well as extraction pressure.

A typical example of a formula for a sweetened limeade superconcentrate, also a tabulation of the composition of the ingredients and limeade beverage, are given in Table I. Amounts of solids and citric acid in the constituents are given in pounds-per-gallon so that the relationships readily can be visualized. Inter-relationships of percent-by-volume, pounds-per-gallon, and volume increases due to added sugar were calculated by use of National Bureau of Standards' sugar tables.[5]

The limeade beverage to be prepared was of 11 deg. Brix and 15:1 soluble solids-to-acid ratio. The 8-fold concentrate needed to prepare this limeade would be of 68.55 deg. Brix and the other constituents in proportion. Composition of the lime puree is given, and since the lime juice was made from the same lot of fruit, its composition was the same with the exception of the peel oil, which can be disregarded for the juice because this oil is largely lost during concentration.

By calculation, it was determined that a 2.06-fold lime concentrate was needed to prepare the product. In the lower portion of the table the amounts of the various ingredients are given. In order to make 1 gal. of the 8-fold product, there will be required 0.06 gal. of puree (to supply the necessary lime oil for flavor), 0.42 gal. of 2.06-fold lime concentrate (to supply the necessary acid, supplemented by the acid in the puree), and 6.913 lb. of sugar, which when dissolved increases the volume by 0.52 gal. (to supply necessary sweetness, supplemented by soluble solids in the lime concentrate and puree).

Since the puree at hand contained 0.4% oil by volume, and the superconcentrate requires only 0.024%, then 0.024/0.4 or 0.06 gal. of puree was sufficient to provide enough flavor for 1 gal. of superconcentrate. Acid requirement for 1 gal. of superconcentrate, to be supplied by concentrated lime juice, was 0.477 lb., calculated by difference. Sugar requirement was the difference between total required solids and solids supplied by puree and concentrated lime juice, or a net of 6.9 lb.

In order for the three constituents to total 1.00 gal. in volume, the concentration of lime juice was conducted so that 0.477 lb. of acid would be present in 0.42 gal. of concentrate. This is equivalent to 1.136 lb./gal., which is 2.06 times the concentration of acid (0.552 lb./gal.) in the original lime juice.

Preparation of 8-fold sweetened limeade superconcentrate which would

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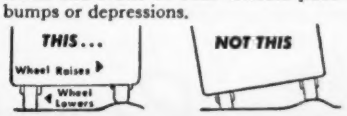

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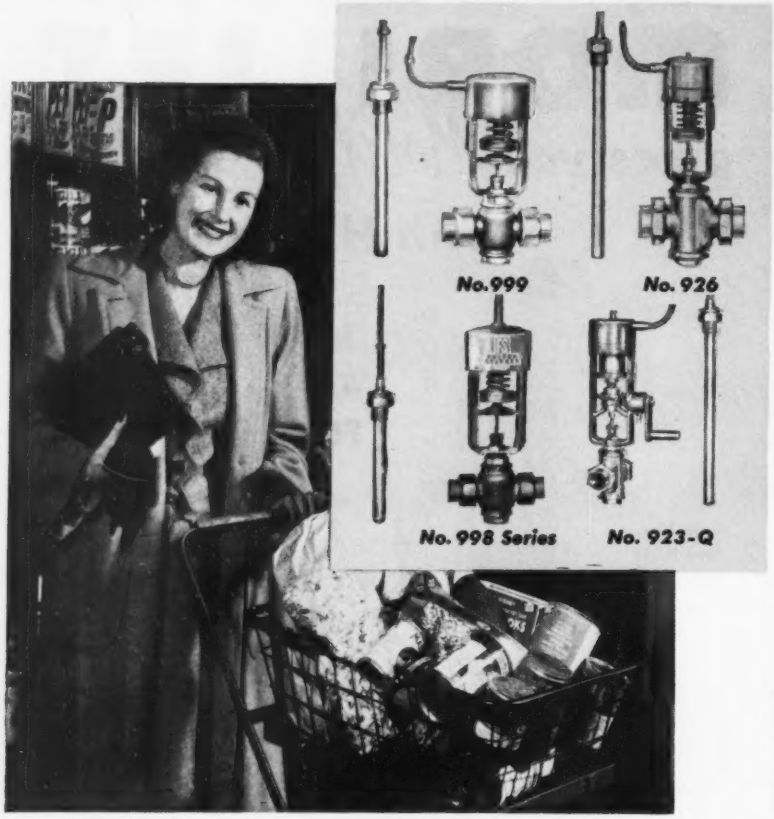

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No. 923-Q is crank-equipped to give quick temperature changes to suit processing stages. A simple turn of the crank and the temperature is quickly set, and held constant.

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CONTROLS COMPANY

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yield a beverage containing 0.010% oil may be accomplished by changing the proportions of ingredients to 0.20 gal. of puree and 0.28 gal. of 2.59-fold concentrated lime juice.

In making *unsweetened limeade superconcentrate*, there is considerable latitude in the selection of volume concentration, or fold, to be produced. As high as 50-fold unsweetened-limeade concentrate theoretically may be prepared. However, it is considered advisable to make some provision for variations in fruit constituents, especially in the peel oil content of the puree.

Therefore, 35-fold is considered as a convenient volume-ratio that can be produced without sacrifice of quality, and which will also permit extensive savings in transportation and storage.

From the second line of Table II it is seen that such a superconcentrate should contain 2.230 lb. of acid per gallon and 0.105% oil. To supply enough oil for 1 gal. of unsweetened superconcentrate, 0.263 gal. of puree was required. This left a volume of 0.737 gal. to be occupied by concentrated juice containing 2.085 lb. of acid. Degree of concentration of lime juice needed to fit these two requirements—5.12-fold—was calculated similarly to the previous example.

The amount of sugar to be added at the time of beverage preparation was calculated by subtracting the solids contained in the gallon of superconcentrate from 15 times the acid contained therein. In this instance, 15 x 2.230 lb. equals 33.45 lb. of total solids required to maintain the 15:1 ratio. Since the puree and concentrate supply 3.22 lb. of solids, 30.23 lb. of sugar must be added along with water to make 35 gal. of limeade.

When puree containing 0.400% oil is used as the sole source of flavor, unsweetened limeade superconcentrate for the preparation of a beverage containing 0.010% oil can be made to a maximum of 30-fold. At this concentration the proportions of ingredients would be 0.75 gal. of puree and 0.25 gal. of 10.91-fold concentrated lime juice, (75.5 deg. Brix, 52.3% acid), which would require 26 lb. of sugar when preparing 20 gal. of beverage.

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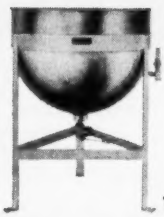
4. Griffiths, F. P., Lime, B. J., and Stephens, T. S. "Notes on the Processing Characteristics of Limes." *Rio Grande Valley Horticultural Institute Proceedings*, p. 110 (1954).

5. *Composition of Sucrose Solutions at 20 deg. C.* Nat'l Bur. Stds. Letter Circular No. 770 (Nov. 1, 1949).

End (Resume reading on page 58)

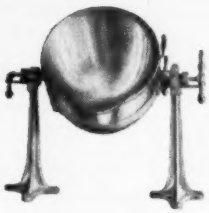
HEADQUARTERS FOR PRODUCTIVE PROCESSING EQUIPMENT SINCE 1928

COOKING KETTLES

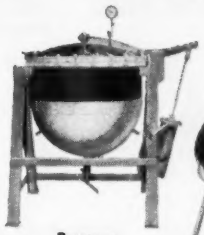


Style A
Two-thirds Jacketed
5 to 500 gal.

Style B
Full Jacketed
10 to 300 gal.



Style C
Two-thirds Jacketed
5 to 100 gal.

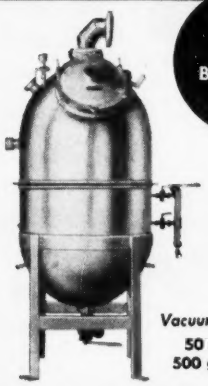


Pressure Kettle
Two-thirds Jacketed
40 to 200 gal.

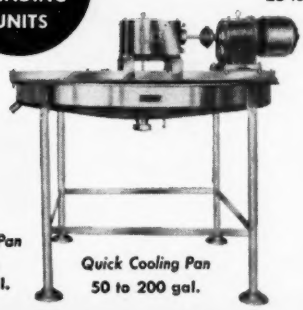
Style CW
Two-thirds Jacketed
80 to 300 gal.

WIDE RANGE OF SIZES TO MEET YOUR NEEDS

MIXING AND BLENDING UNITS

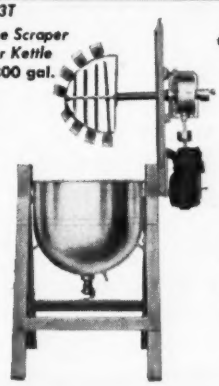


Vacuum Pan
50 to 500 gal.



Quick Cooling Pan
50 to 200 gal.

A3T
Center-line Scraper Agitator Kettle
25 to 300 gal.



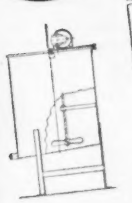
CW3T
Center-line Scraper Agitator Kettle
80 to 300 gal.

ALL UNITS BUILT FROM TIME-PROVED STAINLESS STEEL

LEE

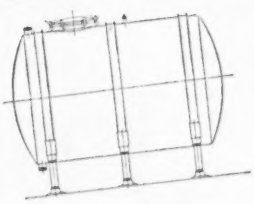
CORROSION-RESISTANT
PROCESSING EQUIPMENT

MIXING, COOKING & STORAGE TANKS



Pulp Tank
500 to 2,000 gal.

Mixing Tank
25 to 500 gal.



Storage Tank
100 to 5,000 gal.

Precision-built to your specific requirements!

LEE corrosion-resistant equipment is individually-designed for a specific processing operation and precision-built to give long years of peak performance with a minimum of maintenance.

Descriptive technical bulletins are available. Write for them and find out how Lee can be of real help in solving *your* processing problems.

LEE METAL PRODUCTS CO., INC.
416 Pine Street
Philipsburg, Pa.

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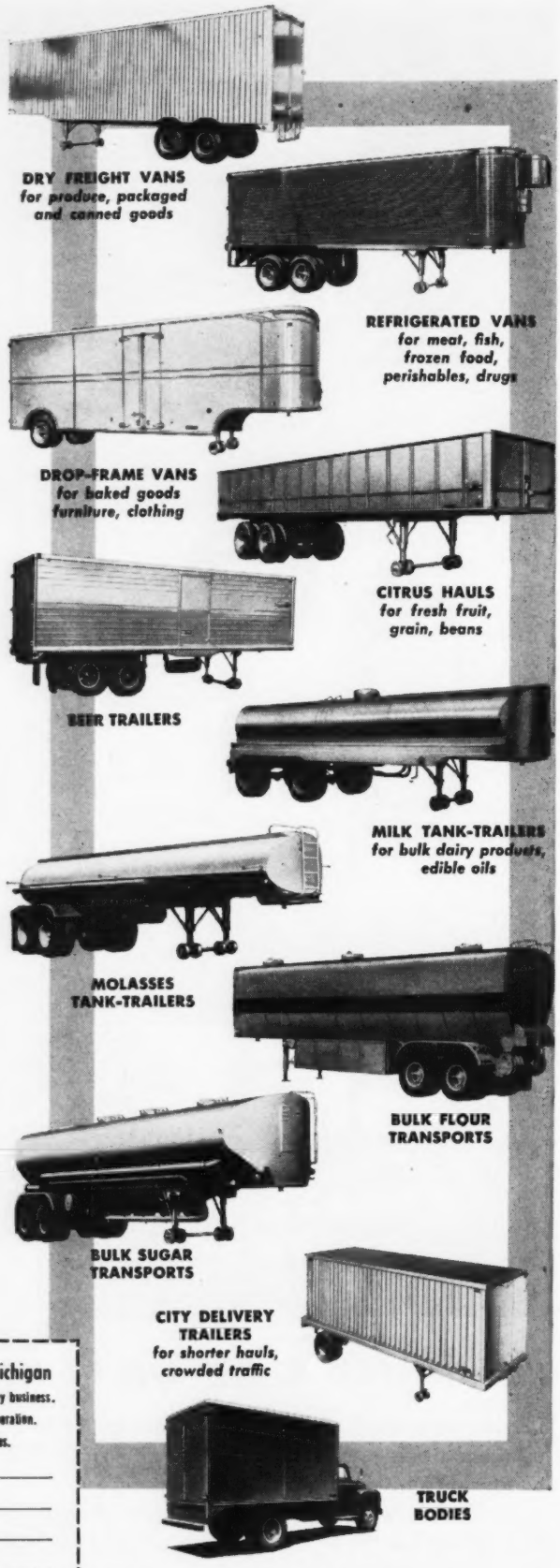
TO CUT YOUR COSTS!

New And Specialized Fruehauf Truck-Trailers Cut Costs In Food, Drug, And Chain Operations!

FOOD DISTRIBUTION COSTS and the cost of shipping in intermediate processing stages *can* be trimmed, simply by the scientific use of Trailers.

Many food processors have realized tremendous savings by shipping materials or products in bulk via specially-designed Fruehaufs. Many distributors and many food, clothing, or drug chains have put new speed and economy into their operations by employing a mobile system of Trailer delivery—for dry freight, refrigerated products, and liquid goods. Trailers cut handling costs, eliminate many costly crating and packing steps, and also serve, when needed, as economical "warehouses on wheels."

You'll find it can pay sizeable dividends in *your* business to investigate the many new applications of Fruehauf Trailers! Send for full details.



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"ENGINEERED TRANSPORTATION"

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- ☐ Please have a Fruehauf salesman call at my office to discuss Trailer specifications for my shipping operation.
- ☐ Please send the free booklet, "New Ways To Profit," showing Trailer applications in MANY businesses.

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COMPANY _____

ADDRESS _____

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FRUEHAUF BUILDS THE WORLD'S GREATEST LINE OF TRAILERS FOR THE FOOD AND CHAIN STORE INDUSTRY

Questions & Answers

THIS MONTH'S PROBLEM

Ejecting Empties on Carton Line

Question—We are searching for a simple method of automatically ejecting empty cartons conveyed from a four-scale net weigher to an automatic case packer. Can you help us on this subject?

APRIL PROBLEM

Filling-Line Changeovers

The Question Was—We have been gradually adding new products and container sizes to our line. As a result we have now reached the point where changeover time on filling and labeling lines is becoming a serious problem. The volume of our items does not justify installing new lines to handle them, yet the frequent changing is costly. Can you offer any solution to this dilemma?

Answer—We believe that your problem is more common than you may realize. Unfortunately, there is no one answer that will equally satisfy everyone. About all we can do is to offer some suggestions that may ease some of your headaches.

First, we recommend that the matter be brought to the attention of top management, so that certain basic decisions can be made. One should be to determine the most economical length of production run, and then see that this is scheduled whenever possible. This can be computed on a cost-per-case basis for several quantities covering a broad range, and should include the changeover costs and also the costs of maintaining inventories (interest and storage).

A second decision should be to concentrate on quick changeover design when considering any new production-line equipment. This factor is being given increasing attention by the equipment manufacturers, who are beginning to offer equipment with hand-wheel adjustments, quickly interchanged unit assemblies, etc.

A third decision should be to apply principles of work simplification and perhaps even incentive pay to the mechanical operation of changing over the line. This would be a good place to use a suggestion system, as the mechanics themselves can often be stimulated by reward or recognition to simplify and speed up the work that has to be done.

We suggest such measures as: (1) Carefully-worded standard instruction sheets, protected by transparent plastic covering; (2) portable racks for change-parts and tools, (3) use of color-coding for change-parts for the same size or product; (4) carefully-made gages for setting guide rails, etc., in minimum time; and (5) scheduling of changeovers during line shut-downs for lunch, rest-periods, or cleanups whenever practicable.

More on Dietetic Jellies

"Referring to your March Q&A on formulating diabetic jellies, here are two suggested formulas:

Formula No. 1, using sorbitol—Mix Exchange pectin L. M. No. 466, 8 oz., with Sorbo (Atlas 70% sorbitol syrup), 7 lb., and dissolve in 14 lb. of water. Now add 1½ oz. of citric acid (monohydrate crystals) and ¼ oz. of Sucaryl Sodium (Abbott) dissolved in a small amount of water. Bring mixture to boil and add 28 lb. of fruit juice. Continue to cook for 10 min. to insure sterility, and then slowly add with good agitation 22 fl. oz. of 2.2% calcium chloride solution ($CaCl_2 \cdot 2H_20$). Solution should preferably be warm. Batch is then ready for filling.

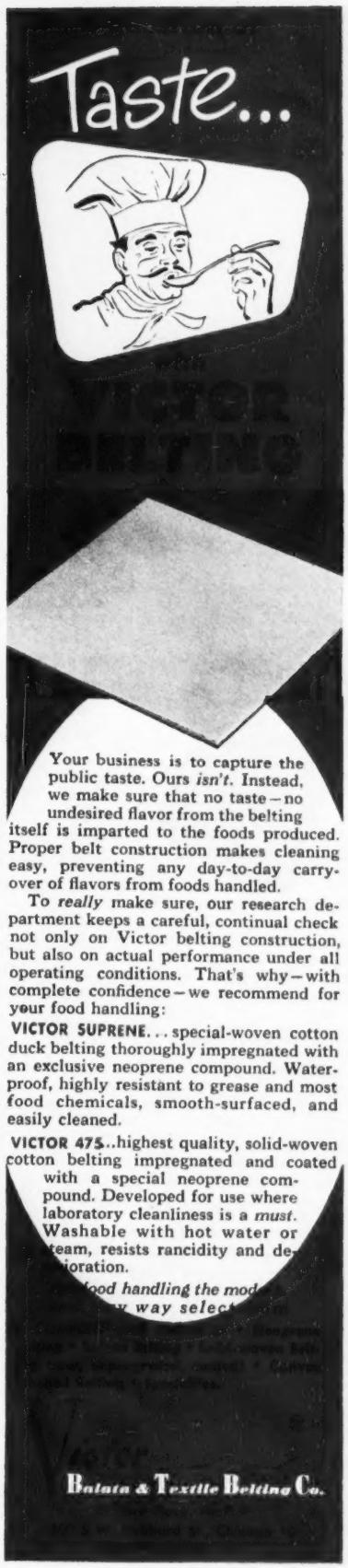
Sorbitol imparts a desirable gloss and body to the jelly and, according to manufacturers, is less readily metabolized by the body than the more common forms of carbohydrates.

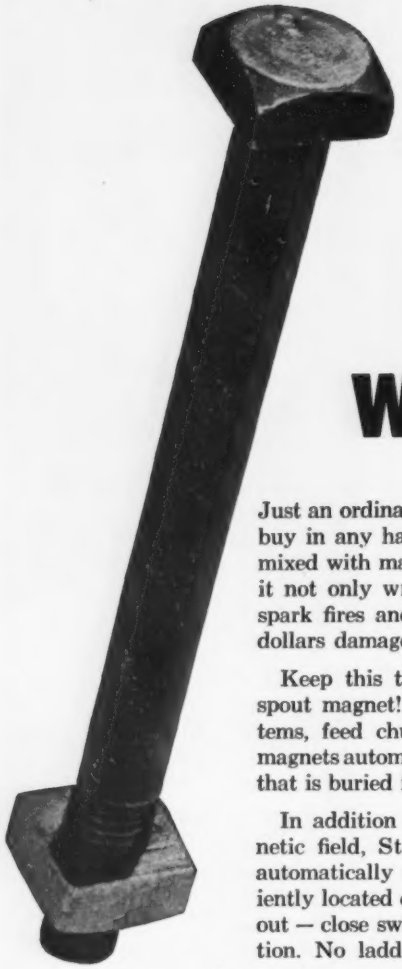
Formula No. 2, with minimum caloric content—if a concentrated juice is available, make a paste of Exchange pectin L. M. No. 466, 1 lb., with a small amount of concentrate. Add paste to 80 lb. of warm single-strength juice and 10 lb. of water in a steam-jacketed kettle.

If a concentrate juice is not available, pectin must be slowly sifted into the juice-water mixture with vigorous agitation so the solution may be achieved without formation of lumps. In either event, heat pectin-juice-water mixture almost to boiling, and slowly add 8 oz. of Abbott Sucaryl Calcium (dissolved in 1 gal. of water). Also heat, with good agitation, and batch is ready for filling.—*W. K. Higby, Sunkist Growers, Ontario, Calif.*

Long Distance Conveying

Question—Our problem involves conveying 500-700 bushels of shelled corn an hour a distance of 126 ft. from a No. 4 Joliet shucker-sheller to the second floor of a grist mill. The sheller is located on higher ground than the


Taste...
Your business is to capture the public taste. Ours isn't. Instead, we make sure that no taste – no undesired flavor from the belting itself is imparted to the foods produced. Proper belt construction makes cleaning easy, preventing any day-to-day carry-over of flavors from foods handled.
To really make sure, our research department keeps a careful, continual check not only on Victor belting construction, but also on actual performance under all operating conditions. That's why – with complete confidence – we recommend for your food handling:
VICTOR SUPRENE... special-woven cotton duck belting thoroughly impregnated with an exclusive neoprene compound. Waterproof, highly resistant to grease and most food chemicals, smooth-surfaced, and easily cleaned.
VICTOR 475..highest quality, solid-woven cotton belting impregnated and coated with a special neoprene compound. Developed for use where laboratory cleanliness is a must. Washable with hot water or steam, resists rancidity and deterioration.
Belting & Textile Belting Co.



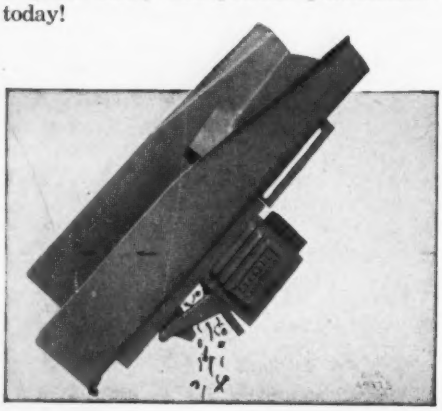
6-inch Plant Wrecker

Just an ordinary, harmless bolt, the kind you can buy in any hardware store for a few cents. But, mixed with materials going through a pulverizer, it not only wrecks costly equipment, but can spark fires and explosions causing thousands of dollars damage.

Keep this troublemaker out with a Stearns spout magnet! Easily installed in conveyor systems, feed chutes, etc., powerful Stearns spout magnets automatically trap and remove tramp iron that is buried in bulk materials entering the plant.

In addition to providing a strong, deep magnetic field, Stearns electro spout magnets are automatically cleaned. Simply open the conveniently located control switch and tramp iron drops out — close switch and magnet is again in operation. No ladders to climb — no hand cleaning.

Reduce explosion, fire and equipment damage, cut insurance rates with a Stearns electro or permanent spout magnet. A postcard request for Stearns Bulletins 92F and 97E is a positive step to plant safety and product purification. Do it today! 1058



Stearns AAA spout magnet discharging tramp iron.

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC. 667 South 28th St., Milwaukee 46, Wisconsin

mill house, yet the corn must travel on an incline—6 to 15 degrees from an horizontal plane. Available is 440 current to run the sheller and conveyor. What type of conveying system would you recommend to serve our needs?

Answer—To the best of our knowledge, a single chain, scraper-type conveyor mounted in a wooden trough would economically and efficiently fulfill your requirements. Make sure that the vertical, metal-type scraper plates are about half the height of the trough—say 2 to 3 in. Weight of the chain and scrapers on the bottom of the trough should be sufficient to move the corn.

For maximum efficiency, install a variable speed drive. If you don't, corn will run over the scrapers on a fast moving belt or it will overload the conveyor and, in turn, overload the motor.

There may be a possibility of some breakage, especially if the corn is caught between scrapers and the trough. However, this should not be a problem since the corn is being conveyed to the grist mill.

Perhaps the second best system is the pneumatic, with the positive method probably being less expensive than the vacuum.

A trough-belt roller conveyor would serve your needs, but such a system would undoubtedly be expensive. This type of conveyor would require three sets of rollers spaced 4-6 ft. apart, depending upon the weight, strength, and nature of the belt. Total length of a 2-ft. wide belt would be about 260 ft.

Our best suggestion is that you sit down with representatives from manufacturers of conveying equipment and go over, in detail, your requirements.

References on Food Filth

Question—We are seeking source material on methods of detecting extraneous matter in foods. Can you help us?

Answer—We suggest the following references:

1. "The Microanalysis of Food & Drug Products," *Food & Drug Circular No. 1.* Prepared by the Microanalytical Div., Food & Drug Admin., Federal Security Agency. Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

2. *The Journal of the Association of Official Agricultural Chemists*, published quarterly by The Association of Official Agricultural Chemists, Inc., Box 540, Benj. Franklin Station, Washington, D. C.

3. "Analytical Methods in the Food

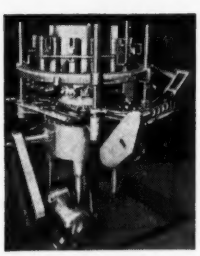
Total filling time: 7 seconds!

Shown in this picture are just a few of the many leading brands handled on Pfaudler high-speed fillers. At speeds ranging from 200 to 600 cans per minute, not one of these containers required over 2/5 of a second filling time.

How you can profit from Pfaudler high-speed filling ... as these leaders do!

Your containers don't linger on a Pfaudler filler. In just 1/5 of a second—faster in many cases—anything from thick soups, sticky syrups or semifrozen juices can be accurately filled and hustled off to the closing machine!

You save time, increase your production and eliminate spillage! This is why leaders in the food industry use Pfaudler fillers to pack the products shown above (and many more!).



RP-14 Piston Filler

Fill 350-400 cans a minute

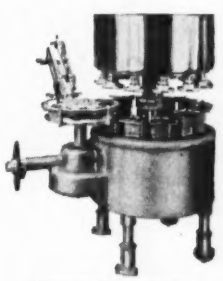
You can fill any container from 3 to 32 ounces, with semi-liquid products, when you use this Pfaudler RP-14 piston filler. It has the Pfaudler "no-can-no-fill" feature that prevents spilling your product when there is no container under valve. Filler heads are easy to dismantle for cleaning. This can be done quickly, without requiring any special tools, And you can easily regulate the fill of its 14 pistons by turning a single quick-adjusting screw, even while machine is in operation.

Up to 600 containers a minute

You enjoy all the advantages of the RP-14, plus extra speed, with this RP-21 piston filler. As on other Pfaudler fillers, all contacting parts are stainless steel and copper-free nickel alloy. RP-21 fills containers of 3 to 16 fl. oz.

Fast filling of liquids

You fill up to 400 containers a minute with this Pfaudler gravity flow filler. Changes over easily from one size container to another. Fills cans from 8 oz. to No. 10 size. Stainless steel open-air tube valves, stainless steel reservoir, and fully enclosed turret and base assembly for maximum sanitation.



Gravity Flow Filler

For further information of the efficiency of high-speed filling, mail the coupon today!

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Gravity Fillers · Piston Fillers · Steam Peelers · Deaerators · Vacuum Pans · Evaporators

THE PFAUDLER CO., Dept. FE-6, Rochester 3, N. Y.

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- ☐ Pfaudler Rotary Piston Fillers
- ☐ Pfaudler Gravity Flow Fillers

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....

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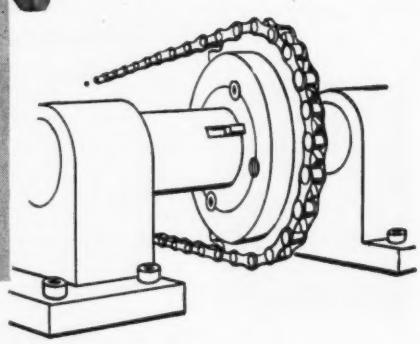
order today

get them tomorrow

installed minutes later



Yes, the quick, off-the-shelf service on Rex Sprockets with Taper-Lock Bushings is that fast. Phone today, and sprockets are on their way to you. No time-wasting, cost-adding reboring, keyseating or setscrews required.

And you install them in a matter of minutes! Just assemble sprocket and bushing and lock them on the shaft. Setscrews force bushing in tapered bore of sprocket...causing it to clamp tightly onto shaft. It's just as easy to remove them. You save money, too! Rex Sprockets with Taper-Lock Bushings generally cost less than ordinary Type "B" Sprockets rebored with keyway and setscrew.

When you need quick delivery on sprockets, call your local Chain Belt Company Distributor. He's listed in your classified directory.

CHAIN BELT COMPANY

Roller Chain Division, 325 Plainfield St., Springfield 2, Mass.
District Sales Offices and Distributors in all principal cities

For more information, use coupon on page 181.

Industry." Published by American Chemical Society, 1155-16th St. N.W., Washington, D. C.

4. *Quarterly Bulletin of the Association of Food & Drug Officials of the U. S.*, John W. Sanders, Jr., 2411 N. Charles St., Baltimore 18, Md. is the publisher.

5. Bureau of Chemistry Bulletins by Howard. Available from Superintendent of Documents, Government Printing Office, Washington, D. C.

6. "Insects," The Yearbook of Agriculture, USDA. Availble from Superintendent of Documents.

Food Standards Query

Question—We've grown to the point where we're considering making interstate shipments. But our biggest roadblock is figuring out how to comply with the many food standards without the aid of a legal department. Can we proceed without legal aid? If so, how? And would you outline the different food standards, interpretation of them, and regulatory enforcement agencies involved?

Answer — Complying with food standards without legal aid should not be difficult. We suggest your purchasing agent obtain a list of Food Standards from the FDA (Food & Drug Administration) and U. S. Standards of Food from the USDA (U. S. Dept. of Agriculture).

These standards will serve as a guide to better and more intelligent buying of raw materials. By blocking entry into the plant of insanitary, infested, substandard ingredients, you will be operating a more efficient and sanitary food plant.

At present, there are two sets of food standards that should concern you. One issued under the Federal Food, Drug & Cosmetic Act of 1938 is the *Food Standards*—regulatory laws enforced by the FDA. The second issued under the Annual Dept. of Agriculture Appropriation Act and the Agricultural Marketing Act of 1946 is the *Grade Standards*. The latter are issued by the USDA, and are known as permissive standards. They are set up to permit uniformity in the classification of food products to be packed and marketed.

Under the Federal Food Drug, a

Q.–Any suggestions on preventing inside fogging of sealed polyethylene bags containing washed potatoes?

A.–Use "poly" bags with small holes that will permit escape of moisture vapor.

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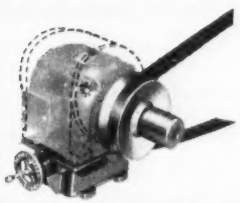
Vari-Speed Motor Pulley

Smaller Units! More HP!

Completely new redesigned line from ½ to 15 HP!

NEW

"spiral-groove" lubrication



For new or old NEMA Motors

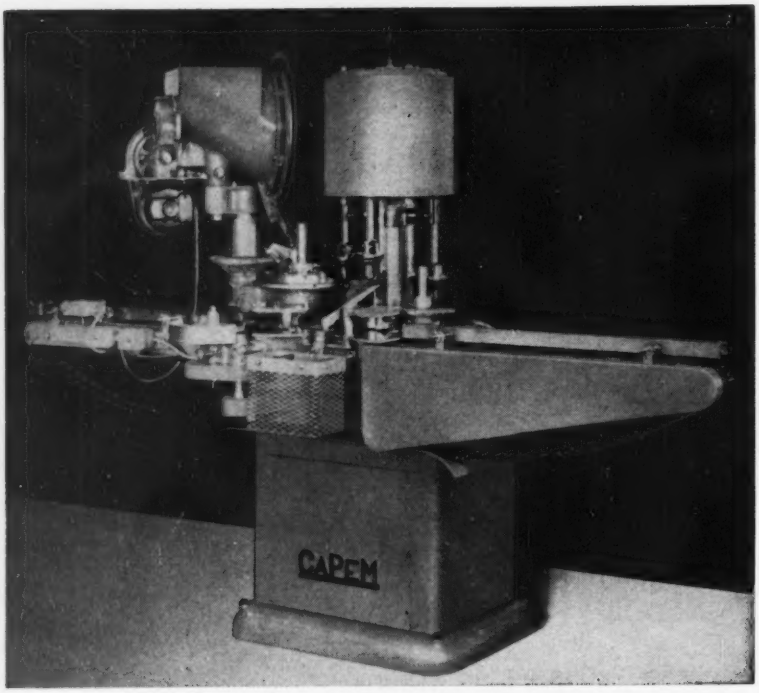
CHECK ALL THESE NEW REEVES FEATURES

1. New, smaller disc assemblies are engineered for new NEMA Motors, yet usable with old.
2. New spiral-groove lubrication assures complete lubrication for years of rust-free, trouble-free service.
3. One-point lubrication. Unit can be lubricated when stopped, or *while in operation.*
4. Superior base construction provides greater rigidity and strength, reduces vibration and noise.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Write for complete details and new bulletin today!
Specify Dept. FE8-V545.

For more information, use coupon on page 181.



CAPEM

THE MODERN SCREW CAPPER

- Applies any type of standard screw cap or cover at speeds of 2000 to 10,000 per hour.
- Takes container from conveyor line, applies cap perfectly, and returns container to conveyor AUTOMATICALLY without intermediate handling.
- Handles bottles, jars, cans or jugs of any size or shape.
- Delivers a perfect, LEAKPROOF seal at low cost.
- Available in 1, 2, 4, 6 and 8 spindle models.

Write for prices and delivery.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO 13, N.Y.

Cosmetic Act of 1938 (Section 401), reasonable standards of definition, identity, quality, and fill of containers are established. Section 402 on filth and adulteration provides the FDA with unofficial tolerances—though none have been set up for filth, which would otherwise permit an unscrupulous processor to get by with inferior or unwholesome products.

Aside from safeguarding the consumer this Act protects you, the processor, by preventing sale to you of adulterated or mislabeled raw materials. From here, you are responsible for the purity of food products, once the raw materials are in your plant.

If you have purchased a raw material and found it contaminated, adulterated, or unfit for human consumption, then notify the FDA. The important point here is that you do not violate the Act by returning the material across State lines to the supplier—even if you don't own it.

Main purpose of the Grade Standards is to enable processors of raw materials to produce and package uniform quality products to be marketed in a more orderly and efficient manner. Through the USDA, the purchaser may obtain inspection services and certification on the quality, condition, and grade of a product that he buys.

A purchaser buying on U. S. Grade Standards can be certain of receiving what he ordered. If the product does not meet contract specifications, the buyer does not have to accept it. And, in some cases, the product may be purchased at a price reduction.

In each U. S. Standard for Food are: (1) a definition of product for the purpose of applying grades; (2) definitions of commercial practices with respect to type, style, and the like; and (3) quality requirements (for each grade) on appearance and eating quality of product in line with processing, marketing methods, and consumer preferences.

These standards are not mandatory requirements. They are merely voluntary standards used by the industry

---

Q.—Have you formulas and instructions for making dry (French) and sweet (Italian) vermouths?

A.—Bulletin No. 651, "Commercial Production of Dessert Wines," by M. A. Joslyn and M. A. Amerine, and published by the University of California, Berkeley, California, is an excellent source of information on manufacturing vermouths. In it you will find 19 herb mixtures in vermouth recipes.

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Try TRI-CLOVER

Compare these fitting features...

- **FABRICATED FROM TOP QUALITY STAINLESS STEEL**
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- **SWEEP CONSTRUCTION — FULL FLOW — NO CREVICES**
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- **TRUE O.D. DIMENSIONS — POSITIVE ALIGNMENT**

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Tri-Clover offers the complete "TRI-CLAMP" line of fittings and valves, for cleaned-in-place installations. These fittings, in sizes from 1½" through 4" O.D., are simple, fast and economical to install, and are thoroughly proved in service.

To convert existing Acme thread fittings to C-I-P service, a simple, positive Super Speed Conversion Tool is available.

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These features are representative of the extra measure of quality you get when you standardize on TRI-CLOVER Stainless Steel Fittings, in sizes from 1" through 4", for your sanitary lines. These same high standards of quality and performance apply equally well to the complete line of valves, pumps, tubing and specialties which Tri-Clover has furnished to the food, dairy, beverage and brewing industries for over thirty years.

For *one* quality source of supply for *all* your sanitary line requirements, be sure to specify TRI-CLOVER.

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PASTEURIZERS & PROCESSORS

IN GREAT BRITAIN
BARRY-WEHMILLER MACHINERY CO.

as a guide. Under certain conditions however, they may be adopted by a State as mandatory.

The Dept. of Agriculture uses either Food & Drug Standards of Identity as a starter (if they have been issued on products), or it sets up new ones (where none have been established). For grade C products, this department adopts the minimum standards of quality that have been set up by Food & Drug.

If a grade-labeled product does not conform with the requirements, it is considered mislabeled and liable to seizure by Food & Drug inspectors. This is a violation of section 403 of the Act, which considers a food misbranded if it is represented as specified in the definition and standard and yet quality falls below such standard, or it contains other ingredients not properly stated on the label.

Help on Cake Cones

Question—Do you have any formulas for making ice cream cake and waffle cones? The latter is prepared by pouring batter into a waffle iron, removing while hot and plastic, and then rolling over a wooden mold to form an ice cream cone.

Answer—As to making the cake-type cones, whip until stiff in a vertical, beater-type mixer 4½ qt. of egg whites and 9 lb. of sugar. Mix separately: Flour 180 lb.; potato starch, 22½ lb.; egg yolks, 4½ pt.; ammonia, 2 lb. 13 oz.; salt, 9 oz.; and sufficient milk until a stiff batter is obtained. Flavor to taste. After mixing for about 20 min., add egg whites and sugar, and continue constant mixing for 5 min.

Now to making the waffle type cone. Mix flour (soft), 20 0lb.; sugar, 50 lb.; eggs, 12 qt.; milk, 12 gal.; salt, 1 lb.; baking powder, 1 lb.; and sufficient vanilla.

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to "This Month's Problem."

Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

What is *Your Problem?*

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

NEW tubing folder

yours for the asking

Read this new "WALLINGFORD QUALITY TUBING" booklet and get the complete story of how WALLINGFORD'S integrated strip and tubing mills, up-to-the-minute equipment and skilled craftsmen can help you solve your tubing problems.

For a better product, *delivered on schedule*, call on WALLINGFORD.

THE WALLINGFORD SINCE 1922 STEEL CO.
WALLINGFORD, CONN., U. S. A.
• HIGH CARBON • ALLOY • STAINLESS • STRIP and TUBING
LOW CARBON

MAIL COUPON TODAY

FOR YOUR FREE COPY

THE WALLINGFORD STEEL CO. WALLINGFORD, CONNECTICUT
Send me your new folder "WALLINGFORD QUALITY TUBING" today.

NAME_____
TITLE_____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE____ STATE_____ FE-6

For more information, use coupon on page 181.

Processor takes the hard work out of Condenser Descaling

Circulating Oakite Compound No. 32 solution removed deposits from condenser tubes within 4 hours

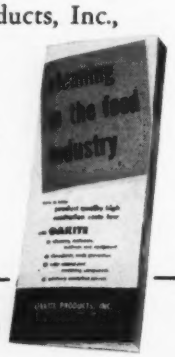
There were four of these condensers at one processing plant—big ones, with up to 875 tubes per unit. Manual removal of scale and oxides meant plenty of sweat and strain with rod and drill. Oakite was called in to simplify the descaling operation.

The Oakite Technical Service Man recommended circulating Oakite Compound No. 32 solution through each unit, one at a time for the sake of economy and to assure more effective cleaning. He then worked out with the maintenance crew this effective procedure.

First, the solution was circulated in each unit for 3 to 4 hours: followed by a rinse. Next came a half-hour circulation of Oakite Composition No. 20 for neutralization. By next morning, all units were treated, all without a sign of scale, all done in-place, and done better than had been possible with drill.

Proving that . . . for industrial cleaning it always pays to consult Oakite.

Many money-saving cleaning operations by Oakite scientific methods and materials described in this bulletin No. 7709. Write Oakite Products, Inc., 26G Rector Street, New York 6, N.Y.



SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives Principal Cities of United States - Canada

Removing Bad Kernels

Question—Last year, considerable tonnage of raw whole-kernel corn was lost at our cannery because of corn borer and earworm infestation—not to mention the manhours wasted. Are you familiar with a technique or equipment for separating out infested kernels along with bits of silk, husk, and injured kernels?

Answer—Latest we know is a modfied flotation process that shows promise of doing just what you wish. This process was originally developed by the Agricultural Research Service Fruit & Vegetable Products Laboratory (USDA) at Prosser, Wash., to remove berries of nightshade—a common peafield weed—from shelled peas.

In the case of peas, the researchers devised a method of treating mixed peas and berries with an air-oil-water detergent(sodium lauryl sulfate) emulsion. Resulting froth floats out contaminating berries. And, we understand, sweet corn will create its own froth.

Safe Flour Handling

Question—We are considering installing a bulk flour-handling system. Can you advise what precautions are needed to minimize dust hazards?

Answer—To begin with, the building housing the storage bins and other equipment should be of noncombustible construction. It would also be best to separate this building from the main plant by firewalls and to provide stairways and elevators in this vicinity with firewalls and fire doors.

Bins should be of strong, noncombustible material, with dust-tight covers and ventilating ducts to the outside. They should be fitted with 24-in. dia. manholes and provided with dust-tight lighting fixtures. Ordinary drop lights must not be used. Bottom of the bins should slope at least 60 deg. to prevent dust accumulations. Bins as well as vent ducts should withstand interior explosions.

Conveyors and elevators should be dust-tight (as much as practical), strong enough to resist explosions, and adequately vented to the outside.

Dust collectors should not serve several purposes. Dry type collectors should preferably be outdoors, although the wet types may be inside. Again, explosion vents are needed.

Walls should be smooth surfaced. Avoid ledges and beams, or else build them up at least on a 60-deg. angle to prevent dust accumulations.

Naturally, all electrical equipment and wiring must conform to the National Electrical Code provisions

Satisfaction rests on the carton

Separated by thousands of miles, families every day sit down to enjoy this favorite dish, secure in the knowledge of its consistent wholesomeness. Quality control is important to Stokely-Van Camp right through to the shipping containers which protect this largest selling brand of Pork & Beans on its way to the nation's markets. That's why so many Stokely-Van Camp products are shipped in dependable Union boxes, quality controlled from pulp to printing in the world's largest integrated Kraft container plant.

TRADE MARK UNION
INTEGRATED PLANNING
INTEGRATED PRODUCTION

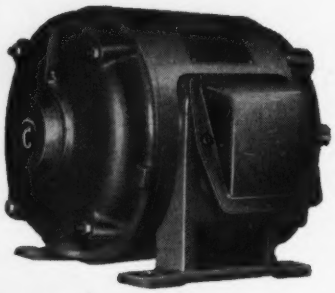
UNION BAG & PAPER CORPORATION

CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
Western Division Sales Offices: 4545 West Palmer, Chicago 39, Ill. • Executive Offices: Woolworth Bldg., New York 7, N. Y.

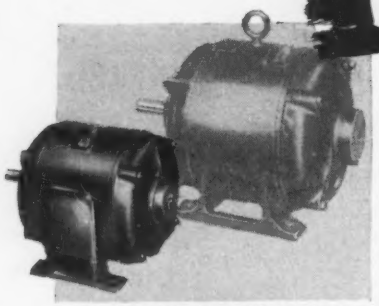
For more information, use coupon on page 181.

NEW Century Performance-Rated® INTEGRAL H.P. MOTORS



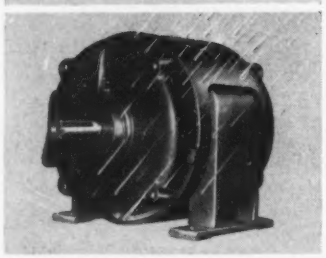
Now available in
1 . . . 1½ . . . 2 H.P. sizes—
NEMA frames 182 and 184.

Improved Motors to match your needs



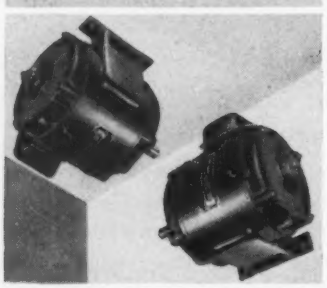
SMALLER — LIGHTER

More uniform silicon-laminated steel; thinner, *tougher* "Mylar" slot insulation — just two of the many technical developments that help make these new Century Performance Rated Motors so much *smaller* and *lighter*.



BETTER PROTECTION

New concepts of internal motor ventilation permit end bracket and frame design that gives far better protection from falling liquids and solids . . . still maintain 40°C. temperature rise.



MORE FLEXIBLE MOUNTING

You can even have cushion mounting with these new Century Integral H.P. Motors — your choice of sleeve or ball bearings. Ball bearing motors mount vertically, upside down, in any position. End brackets can be rotated for top protection in any position.

869

EVEN MORE DEPENDABILITY

Improved plastic impregnating varnish and plastic insulated magnet wire provide unusual resistance to abrasion, moisture and heat. These new materials possess far better dielectric qualities. Die cast aluminum rotors are individually, dynamically balanced to assure freedom from vibration.

Century C MOTORS

Specify CENTURY Performance Rated motors for your equipment. Call a Century District Sales Office or your nearest Century Authorized Distributor.

Offices and Stock Points in Principal Cities

CENTURY ELECTRIC COMPANY • 1806 Pine Street • St. Louis 3, Missouri

For more information, use coupon on page 181.

for hazardous locations (Class II, Group G).

Using non-sparking metals, grounding all equipment to prevent static sparks, and preventing other sources of ignition are important.

Be certain to provide proper fire-fighting equipment. For example, a heavy hose stream can prove harmful inasmuch as it stirs and spreads dust. Needed are spray or fog nozzles.

For full details, we suggest that you study the standards set up by the National Board of Fire Underwriters for the prevention of dust explosions.

Stopping Water Seepage

Question—In one of our brick buildings, we are troubled with moisture seeping through some outside walls, near the roof. At first, we thought the roof leak was at the parapet flashing. Repeated, careful examinations proved that this was not so. Can you tell us the possible cause and cure?

Answer—Your trouble sounds very much like the common one—leaks in the parapet copings and porous parapets. They are likely to occur when the coping mortar joints open up as a result of expansion and contraction. As a result, moisture penetrates into the parapet masonry and thence into the walls themselves.

We suggest that you thoroughly inspect all copings. Chisel out old cracked mortar to a depth of ½ in., and completely remove it where it is crumbling.

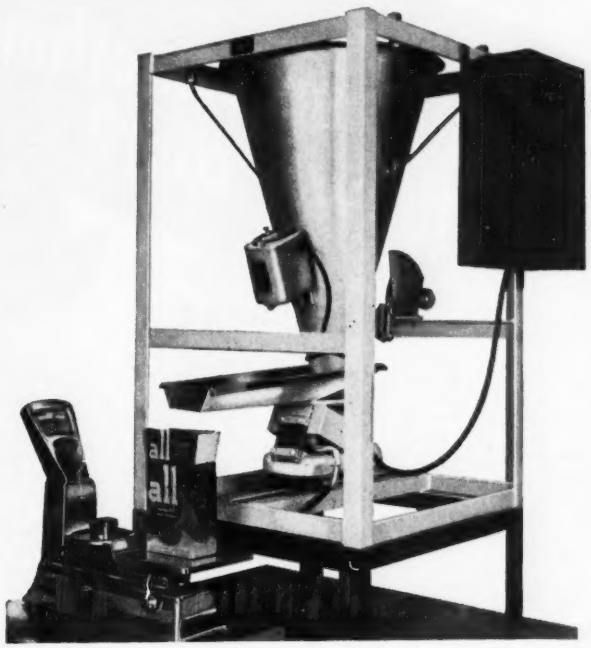
In the latter case, pack the joints with oakum to within ½ in. of the surface. Then caulk remaining crevices with a caulking gun and finish off level. The coping material can then be treated with a brush-applied sealer, or if preferred one for trowel application, or one for spraying on.

It would be well to check the parapets themselves to be sure they have

---

Q. We are now hand packing six doughnuts into a waxed glassine bag. Can this operation be carried out automatically or speeded up in any manner?

A. To the best of our knowledge, there is no method of automatically bagging doughnuts. Even those doughnuts put up in folding cartons and in transparent film-overwrapped trays are packed by hand. You might, however, look into the possibility of speeding up this operation by installing a pneumatic bag-opening device for each packer.



EXACT WEIGHT
Weighing Machine
for Extreme Accuracy at High Speed

Increases speed and accuracy in packaging, bagging, batching, or compounding of chemicals, powders, flakes, crystals, granules, and many other dry products. Empty package is placed on scale manually. Pushbutton or foot switch starts vibratory feeder and hopper vibrator. After the bulk fill, the photoelectric control on the scale automatically cuts off both the fast feed and the hopper vibrator, and starts the slow feed which cuts off at EXACT WEIGHT. Adaptable to a wide range of materials and operations. Low initial cost . . . low upkeep. Send coupon for details.

Sales and Service from Coast to Coast.

Exact Weight Scales

Better quality control
Better cost control

THE EXACT WEIGHT SCALE COMPANY

910 W. Fifth Avenue, Columbus 8, Ohio
2920 Bloor St. W., Toronto 18, Canada

Please send complete information on Model 103-FM-0-10

Name .....

Address .....

City..... Zone..... State.....

For more information, use coupon on page 181.

Wanta pump something at lower cost?

CHECK HERE

Air	Dye Solutions	Latex	Salt Water
Alcohol	Edible Oils	Mash	Shortening
Ammonia	Ethane	Methane	Sludge
Beer	Fish Oils	Milk	Soap
Benzol	Formaldehyde	Molasses	Sodium Chloride Solution
Boiler Feed Water	Fresh Water	Naptha	Sodium Silicate
Brewer's Mash	Gas, Manufactured	Nitric Acid	Sodium Sulfate Solution
Butter	Gas, Natural	Nitrogen	Starch
Butane	Gasoline	Oil, Crude	Sulphuric Acid
Cane Syrup	Glucose	Oil, Refined	Sump Water
Calcium Carbonate Slurry	Glue	Oxygen	Sweet Water
Calcium Sulfate Slurry	Glycerine	Paint	Tomato Juice
Casein Solutions	Glycols	Potassium Hydroxide	Varnish
Cement Slurry	Hydrochloric Acid	Propane	Vinegar
Chocolate	Hydrofluoric Acid	Raw Boiler Feed Water	Viscose
CO_2 Gas	Ink	River Water—Dredging Operations	Water (various)
Crude Oil	Jam	Rosin	Wax
Dairy Products	Jelly		Whey
	Ketchup		
	Lacquer		

THIS list of fluids will give you a rough idea of the diversity of pumping jobs in which Darcova Pumcups are responsible for really *big* savings.

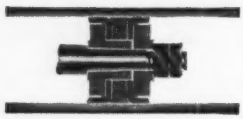
It boils down to the fact that Pumcups all but eliminate fluid slippage *throughout* their life span . . . and they *last many times as long as other packings.* Think of the down-time avoided, the production gains due to prolonged high efficiency, and the time-and-money-saving reduction in maintenance!

Years of application research have gone into the development of Pumcups. Made today in standard as well as many special compositions and textures for a wide range of temperature and pressure conditions, they offer you superior cost-cutting service in virtually *any* pumping job, simple or tough! And they're available in diameters from 1 to 20 inches.

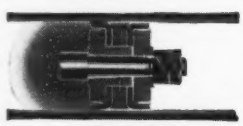
SEND FOR FREE BULLETIN

Why not weigh *all* the facts? Bulletin 4401 covers Darcova Pumcups for reciprocating pumps; Bulletin 4502 on Pumcups for air or hydraulic mechanisms. Write for yours today.

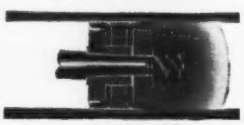
DIAGRAM OF DARCOVA PUMCUP ACTION (greatly exaggerated)



NORMAL: BOTH PUMCUPS RELAXED



UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE



DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 20, PA.

DARCOVA
THE ORIGINAL COMPOSITION CUP

PUMCUPS

not been forced out of line. Point them as necessary.

Sanitary Work Platforms

Question—Our plant sanitarian has reported that the wooden operating platforms around our cooking kettles are creating unsanitary conditions which are practically impossible to eliminate. Consequently, we are faced with the prospect of removing all wooden structures and substituting them with ones that are of more sanitary design and construction. Can you give us an idea of what is considered good practice by other food plants?

Answer—Some use re-enforced concrete for operating platforms. These type platforms will prove satisfactory, in most instances, if they are built with sufficient clearances around and under them, and without corners or crevices so that they can be flushed clean. On the other hand, they will not permit much flexibility in the layout of equipment. Because of their weight, they may be undesirable where floor loads must be limited.

One large company reports very satisfactory use of steel platforms. When employing men, gratings of welded or riveted, flat bar steel may be used. Where girls are employed, the platform should be built of checkered (non-slip) steel plates to prevent their heels from getting caught in the gratings.

In either case, construction without hard-to-clean crevices is a must from the sanitarian's viewpoint. For this reason, welding may be preferable to riveting.

Adequate clearances for cleaning are likewise essential. If the platform is too large to reach under from the edges, you might consider providing hinged, access doors at appropriate points to facilitate the clean-up job.

Preparing Chop Suey

Question—In your April article on "Precooked Frozen Chinese Food" (p. 92) no mention was made of chop suey. Can't it be frozen satisfactorily? Do you have a formula for chop suey?

Answer—Some firms are successfully making precooked, frozen chop suey.

Here's a formula that you can use as a basis, and then alter it to suit the taste of your local trade:

Celery (fresh), 48 lb.; pork (boneless), 30 lb.; veal (boneless), 30 lb.; onions (fresh), 24 lb.; bean sprouts, 12 lb.; mushrooms (fresh), 12 lb.; water chestnuts, 12 lb.; water, 12 lb.; flour (hard wheat), 3¾ lb.; lard, 3¾ lb.; molasses, 3¼ lb.; soya sauce, 2½ lb.; salt, 2 lb.; and pepper (black), 1½ oz.

Heat-sealed pouch brings back real dills—brine and all!

There's no place in today's supermarkets for the old dill-pickle barrel. As a result, genuine dills in brine seemed to be on their way out—much to the dismay of the true dill-pickle lover. But now the genuine dill—in its own brine from the wooden curing casks—is back in the nation's groceries. And an important factor in the "comeback" is a consumer package developed by the H. J. Heinz Co. after six years of research.

This package for dill pickles consists of a Cellophane pouch bag laminated with a film of Du Pont "Alathon" polyethylene resin on the inside. The bags are prefabricated with heat seals on three sides, with the final heat seal made across the top after filling and vacuumizing. Because of its moisture resistance, "Alathon" helps form a barrier that holds the brine and protects the piquant dill flavor. "Alathon" is also acid-resistant and completely taste-free. The handy, small-unit size and the transparency of the package give it consumer sales appeal. And the film of "Alathon" adds tear strength to the package . . . eliminates breakage hazards during shipping and handling.

Offer your customers the advantages of Du Pont "Alathon" on paper, film or foil. "Alathon" is tough . . . stays flexible through a wide range of temperatures—from tropic heat to 100°F. below zero. It resists most greases, acids, oils and alkalies. For more information, fill in and mail the coupon below.

*REG. U.S. PAT. OFF

DU PONT
ALATHON
Polyethylene Resin
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Which type of package are you interested in?

- ☐ Multiwall bags
- ☐ Single-ply bags
- ☐ Pouch bags
- ☐ Board cartons
- ☐ Board trays
- ☐ Fiber drums
- ☐ Corrugated boxes
- ☐ Fiberboard containers

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Dept. 546, Du Pont Bldg.
Wilmington 98, Delaware

Please send me information on the properties and advantages of "Alathon" polyethylene resin for the type(s) of packages I have indicated.

*Name*_____

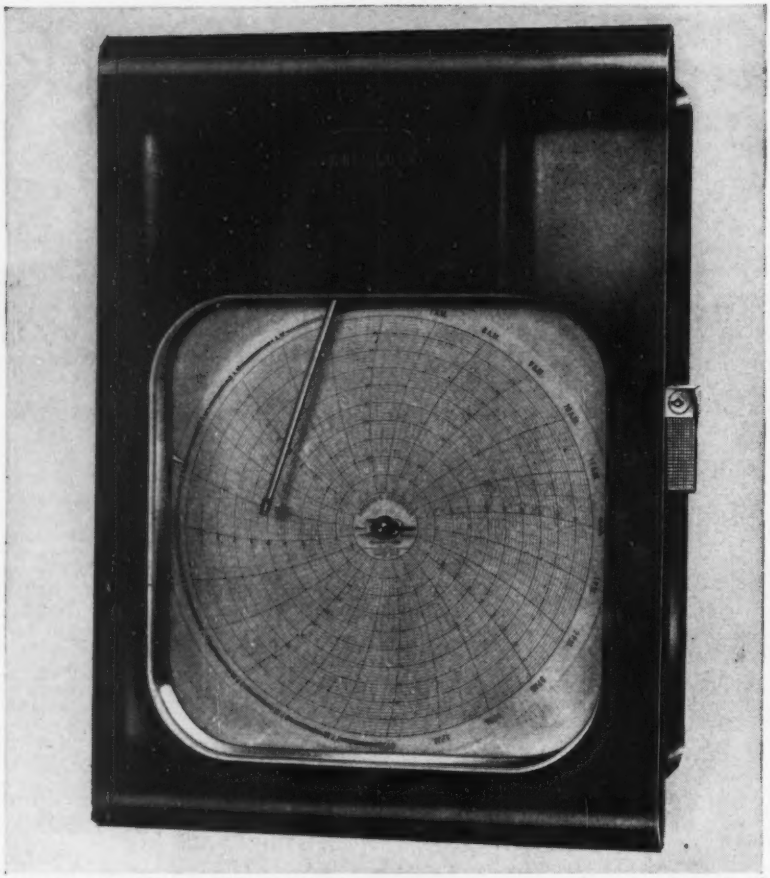
*Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

For more information, use coupon on page 181.



EASY-TO-USE BRISTOL RECORDING GAUGES come in pressure ranges from 0 - 0.2 inch of water to 0 - 10,000 psi. Vacuum gauges are available in various ranges from 0 - 30 inches of mercury and absolute pressure gauges in ranges as low as 0 - 6 mm mercury absolute.

Why are more Bristol recording gauges in use than all others put together?

• That's easy — accuracy and dependability are the reasons.

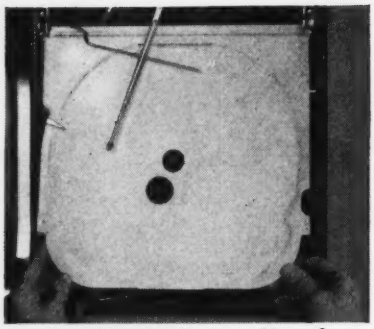
For accuracy, Bristol's measuring elements are unsurpassed. They are the product of 65 years of research and development. Bristol engineers are constantly engaged in developing pressure and vacuum measuring elements of higher accuracy, greater sensitivity, and increased stability.

As for dependability, many Bristol gauges have been in constant operation for more than 40 years — without special attention of any kind!

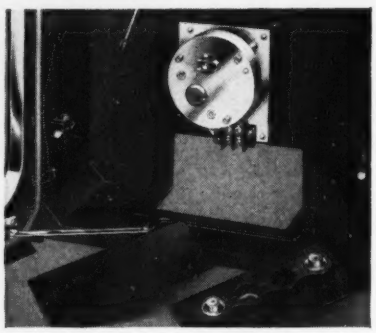
You can get the Series 500 gauge in models designed for recording, controlling and telemetering. Write today for free 32-page Bulletin G621. The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

Many ranges carried in stock for immediate delivery

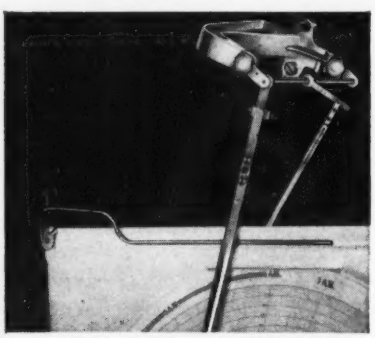
LOOK AT THESE "HUMAN-ENGINEERED" FEATURES!



SNAP-ON TYPE CHART PLATE — No tools are needed to remove chart plate. Spring, finger release permits quick access to the space beneath the chart. Plate is easily replaced.



UNIVERSAL CONNECTION BLOCK — Mounting block for instrument connections easily changed from bottom to back of case or vice versa; measuring system can be removed or replaced.



PEN LIFTER — Simple, non-obscuring pen lifter, mounted independently of the chart plate, raises pen from the chart, provides complete freedom for working on instrument with chart plate removed.

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

FDA Inspection

—Continued from page 48

if the inspection extends over several days, the inspector may leave for sleeping purposes, and the like, without submitting a new notice on his return to the plant.

Written Report of Findings

At completion of inspection, the inspector is required to inform management of all evidence of violation that he found involving the sanitation provisions of the act. This section of the law does not require inspectors to give notice of their findings on anything else. The on-the-spot report is a matter of record and the inspector promptly must send a copy to the Secretary, or, through channels, to his superiors.

During an inspection, an officer or employee of the FDA often is instructed to collect investigational samples. These represent specimens of materials, ingredients, or finished products to ascertain whether or not they have been contaminated by insanitary conditions and to provide facts that can be used in possible later actions.

Where such inspections result in the collection of investigational samples, the inspector must give a receipt to the management, notifying what he has collected. And the administration later must submit to management a written report of its analysis.

It is significant that Congress has recognized that such disclosure of actual analytical findings of the investigational samples later might be used by the firm involved, in labeling, advertising, or sales promotion. Therefore, a new section has been added to the prohibited acts of Chapter 3. To quote—

Section 2. Section 301 of such act is amended by adding at the end thereof the following new paragraph:

"Chapter 3—Prohibited Acts and Penalties

"(301) (n) The using, in labeling, advertising, or other sales promotion of any reference to any report or analysis furnished in compliance with Section 704."

Some Interpretations

It is evident that the significance of this new development in Food & Drug procedure is subject to individual view and appraisal to be based upon experience as it is inforced. Therefore, the writer only offers the following as an opinion:

1. Plant management now must permit inspections.

Specify Farquhar Black Velvet *Roll-Free* CONVEYORS for the most economical gravity installations possible!

In this complete handling system, Farquhar Black Velvet ROLL-FREE gravity conveyors first move cases of empties to bottle washing machine. After bottles are washed, filled and capped, they are stacked in the cases, which have now moved to operator at left. The filled cases are then moved out to storage by conveyor, passing over empties moving in to be washed.

ONLY with Farquhar's line of Black Velvet ROLL-FREE gravity conveyors do you get the assurance of longer, trouble-free service that spells real economy through the years! That's because every wheel, roller and bearing in Black Velvet ROLL-FREE conveyors is treated with a special process to resist rust and corrosion . . . to keep moving parts turning smoothly when conventional conveyors fail. This process is the same penetrating treatment that withstands the 24-hour salt spray test as prescribed by government specifications for certain weapons used under the most severe field conditions, so you know it's *got to be good!*

What's more, ROLL-FREE conveyors give you the maximum strength of rigidly cross-braced steel frames . . . yet are light in weight to assure ease of handling. They're available in straight and curved sections, to fit any installation requirement. When you need gravity conveyors, be sure to specify Farquhar Black Velvet ROLL-FREE conveyors. Our engineers will be glad to assist you, at no obligation!

A complete line of standard Farquhar ROLL-FREE conveyors without the Black Velvet treatment is also available.

OLIVER Farquhar CONVEYORS

POWER-BELT AND GRAVITY CONVEYORS

FREE! "Roll-Free Gravity Conveyor Folder" —showing Roll-Free line, specifications, and typical installations.

MAIL COUPON FOR YOUR COPY

THE OLIVER CORPORATION
A. B. FARQUHAR DIVISION
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. . . Unless it wants to appeal to the Supreme Court against the constitutionality of this Act, which in the writer's view would be folly.

2. Management has the right to require that the inspection be made only when a properly authorized representative of the firm is present.

This is important, for in the writer's experience, there have been many instances where misconceptions have arisen through false emphasis being given to situations that management properly could have evaluated had it been present.

3. The new amendment requires that an inspection be carried out in a reasonable manner.

Much "legal advice" has been offered regarding this subject which, in the writer's belief, has not been sound. For example, it has been advised that inspectors should not be allowed to take photos because this is unreasonable. However, photos are reasonable as a method of showing actual conditions.

The Point on Photos

They have been made admissable in all courts of law when properly authenticated. Certainly, if an objectionable situation is found and an inspector desires to take a photo, a manager has more to lose by objecting and making an issue (which later can be brought up in court) than if he permits photos and immediately corrects the condition.

He is better off, too, by calling attention of the correction to the inspector and emphasizing that there is no intention of permitting this to continue once it was brought to the company's attention.

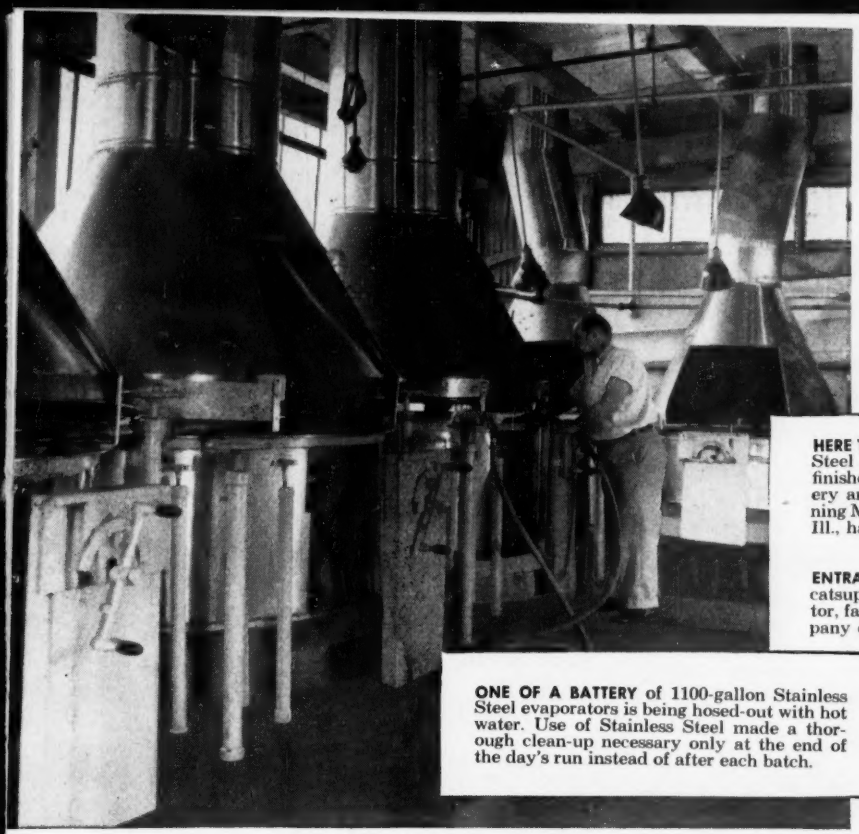
Going Over Records

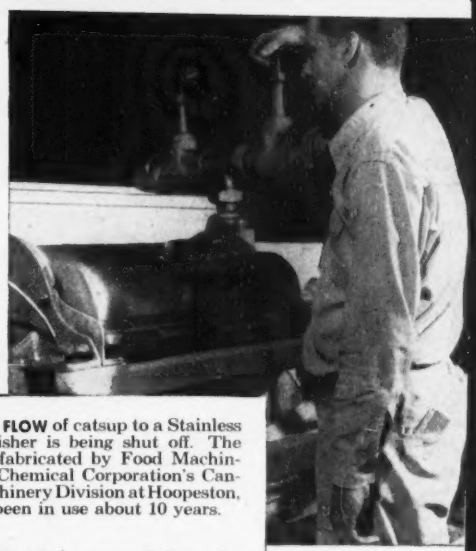
The same is true regarding the request often made by inspectors for permission to go over records. Nothing is to be gained by resting upon the technicalities of this amendment to resist obtaining information that is going to be procured anyway. The inspector can get from common carriers (where he has adequate authority) a record of such interstate shipments as may have been made.

Management should lean over backwards in working out with the inspectors the performance of a "reasonable inspection."

4. Whenever investigational samples are collected, management should obtain identical ones and have them analyzed by its own analysist.

If at any time results of these analyses are utilized commercially, management must be careful to credit their own only analyst. For the FDA

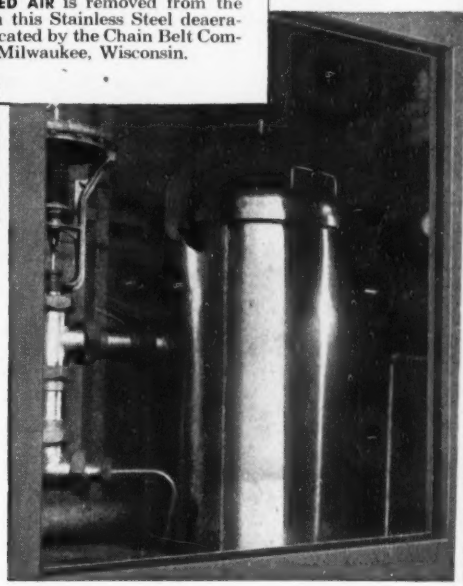




HERE THE FLOW of catsup to a Stainless Steel finisher is being shut off. The finisher, fabricated by Food Machinery and Chemical Corporation's Canning Machinery Division at Hoopeston, Ill., has been in use about 10 years.

ENTRAPPED AIR is removed from the catsup in this Stainless Steel deaerator, fabricated by the Chain Belt Company of Milwaukee, Wisconsin.

ONE OF A BATTERY of 1100-gallon Stainless Steel evaporators is being hosed-out with hot water. Use of Stainless Steel made a thorough clean-up necessary only at the end of the day's run instead of after each batch.



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● The Crosse & Blackwell Company, Baltimore, Md., carries on a tradition of quality in specialty foods established by the English company of the same name. And for sanitation and protection of products, the Baltimore firm makes the fullest use of Stainless Steel equipment.

Processing of tomato catsup, for example, is almost a 100% Stainless Steel operation. Pulp enters eight Stainless Steel evaporators through Stainless Steel pipe; condiments are added and it is cooked. These evaporators were put into service in 1939 replacing equipment of other material which lasted four or five years at the most. Stainless Steel's smooth, pit-free surface makes cleaning after each batch unnecessary; a thorough cleaning at the end of the day's run is enough.

From the evaporators, catsup flows by gravity through Stainless pipe to a Stainless Steel finisher. From the finisher it goes—again through Stainless pipe—to a deaerator made of Stainless Steel. Here it is put under 16-inch vacuum and any entrapped air is removed.

The final step is a Stainless Steel bottle filling machine that has given satisfactory service since its installation approximately 10 years ago.

For prevention of contamination, ease of cleaning and long life with little maintenance, Stainless Steel equipment can't be surpassed. And for the finest possible performance, insist that your processing equipment be fabricated from perfected, service-tested USS Stainless Steel.

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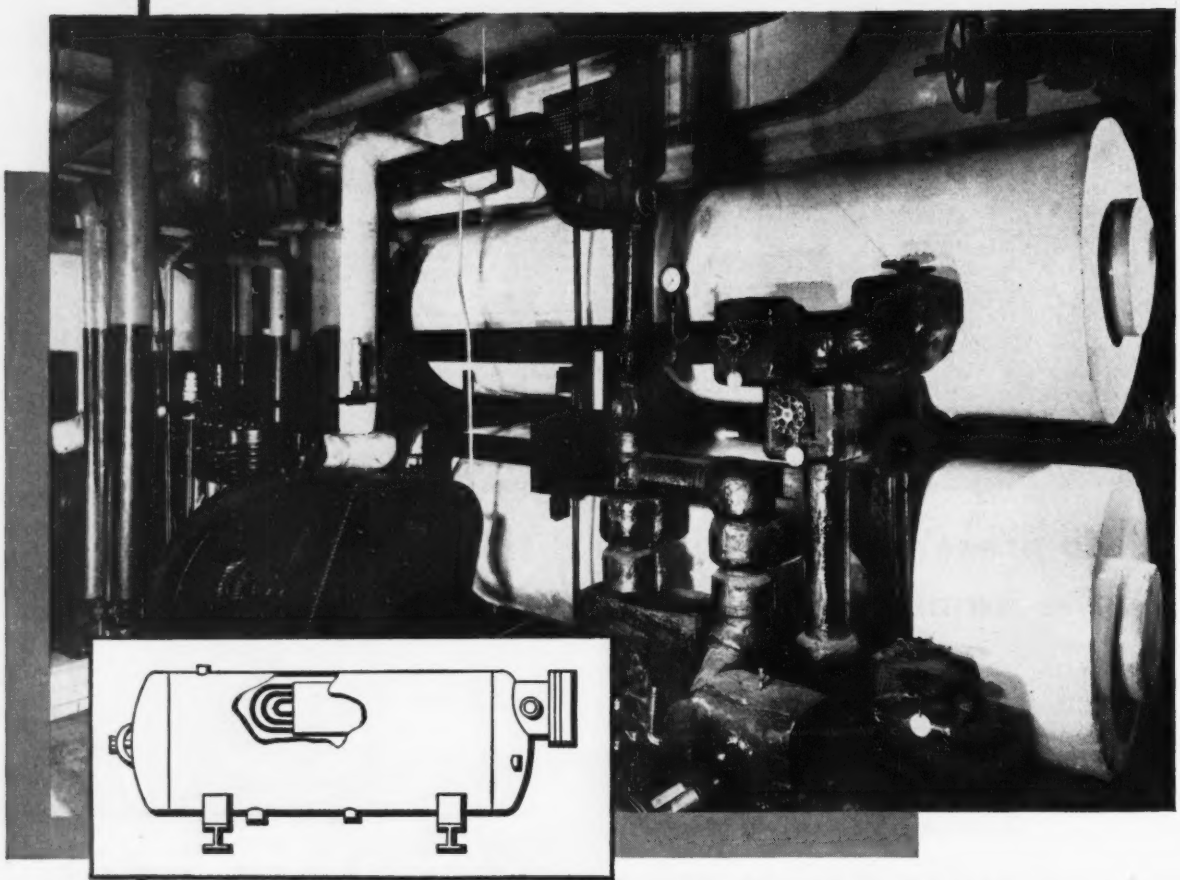
UNITED STATES STEEL

COLD WATER STRATEGY

for processing operations

-p·k *chillers*



A p·k chiller provides chilled water for blending, mixing, external cooling or wherever required in processing operations. p·k chillers feature a combination water storage tank and built-in chiller of corrosion-proof construction.

With this design, smaller chilling surface and refrigerator compressor capacity can be used and the load factor is improved. Individual water coolers are dispensed with and concentration of cooling facilities in one central location reduces initial investment and facilitates servicing. Fluctuating water requirements are easily met without temperature change. Any new or present compressor equipment can be used.

p·k storage water chillers are available in many sizes and in various kinds of materials to suit individual requirements. These same storage cooler units are applicable to any liquid cooling application, in process and other industrial plants.

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is not in a position to perform analytical services for commercial advantage, and the new section under Chapter 3 *prohibits* this act and makes it a serious violation to use such analytical results.

Already there has been a reaction in the food industry. Some firms now feel that FDA is in a position to advise them as to their sanitation status and offer suggestions for improvement and correction in the same manner as a professional consultant.

FDA As An Advisor?

Recently, the writer conferred with a large brokerage house handling foods under private label. Here, the quality control director bore out the above view, saying that in the future he was planning to rely entirely upon FDA approval upon inspection for his knowledge of the sanitation of his plant.

But, it is the writer's feeling that too much emphasis cannot be placed upon a denial of this situation. FDA is not in a position thus to advise management how to proceed in complete complacency without fear of development of insanitary conditions until given warning by the government.

Rather, FDA is enforcing the Food, Drug & Cosmetics Act on a basis of practical procedures designed to give maximum protection to the consumer with the manpower and funds available. This means FDA inspects plants that it has some reason to feel may be in violation, perhaps for reasons of general principles on a project basis, or from some specific complaint.

In a number of cases, the inspector conceivably might not determine many actual violations that could be present. Often, he does not have the time to spend in a plant to determine all possible violations. Chances are that if the plant is insanitary he will stumble on two or three, which he will report to his superiors and which may result in subsequent regulatory actions. However, there might be additional violations that management should have spotted and corrected.

Food manufacturers must maintain their own sanitation programs and system of appraisal of their plant for periodic determinations of their sanitation level and they must then act accordingly.

It is better to know, in advance, where sanitation problems occur and actively cope with them when the inspector comes—rather than to wait for him and then have to wait further for possible regulatory action. In such cases, the fear remains that "next time he may find something that he didn't find this time."

End (Resume reading on page 49)

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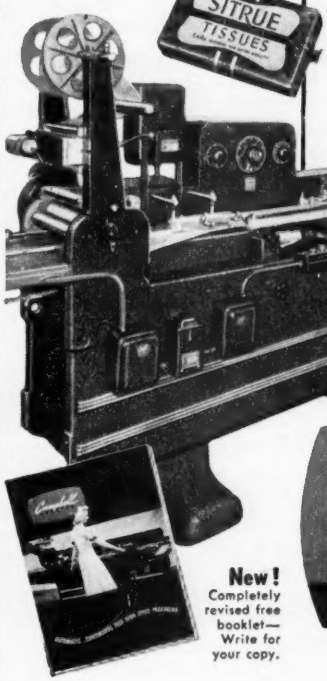

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The KANE BOILER PACKAGE includes: the correctly sized Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

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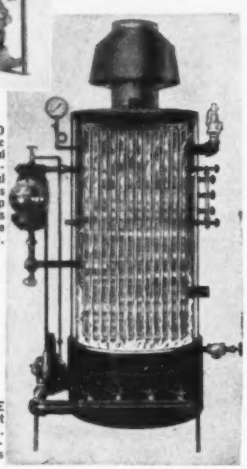
Full details in new KANE Bulletin, No. 2K.



The M-K-O Automatic Boiler Feed returns condensate and supplies make-up water as needed to the KANE boiler.

The KANE Boiler, built to A.S.M.E. specifications, in sizes to 30 H.P.

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Vitamins from A to B

THE VITAMINS Vol. I. *Edited by W. H. Sebrell, Jr. & Robert S. Harris. Published by Academic Press, Inc., 125 E. 23d St., New York 10. 1954. 676 pages. 6¼ x 9¼ in., cloth. Price:* $16.50.

First in a three volume series, this work deals with vitamin A and carotenes, absorbic acid, vitamin B_{12}, and Biotin, with full treatment of formulas, chemistry and industrial preparation.

Written to serve as a guide to vitamins, the work gives special attention to treatment of the vitamins as a group or as complimentary elements, and does not have each writer concentrate on one particular vitamin. The problems and effects of vitamin deficiencies have not been dealt with, the editors being of the opinion that the subject has already been well covered.

Special emphasis has been placed on the physiology and chemistry of vitamins, historical data being included where it has a direct bearing on present development. An extensive bibliography has been included to aid the reader in research. Book is indexed and illustrated.

Scientific Revolutions

HISTORY OF AMERICAN INDUSTRIAL SCIENCE. *By Courtney R. Hall. Published by Library Publishers, 8 W. 40th St., New York 18. 1954. 453 pages. 5⅛ x 3¾ in., cloth. Price:* $4.95.

Written as a general, but detailed, report on scientific progress and its effect on American industry, this work makes use of data supplied by sixty leading corporations.

Developments in the food industry are well covered, with equal information supplied on the companion transportation and agriculture fields.

From Grubs to Caviar

FOOD FOR PEOPLE. *By Sarah R. Riedman. Published by Henry Schuman, Inc., 20 E. 70th St., New York 21. 1954. 192 pages. 5¾ x 8½ in., cloth. Price:* $2.50.

Beginning with an unappetizing visualization of the caveman chewing on raw grubs and hemlock bark, and ending with descriptions of modern accomplishments in nutrition, this book traces the tortuous but always rising path of food technology through the ages.

The discovery of nutrition, and the development of its applications are described excitingly and interestingly, with full attention given to the featured players in the drama. Count Rumford and his calory, da Gama and his scurvy remedy, and Casimir Funk and his vitamin, are all brought into view with their contributions to food engineering.

Simply and accurately, the author explains the part that food plays in the mechanics of the body. She tells why we eat food and what happens when we eat it. A lively and well-written book, it is of value to all connected with the food processing industry.

Book is indexed and illustrated with sketches and diagrams.

Production of Yeast

YEAST TECHNOLOGY. *By John White. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York. 1954. 432 pages. 5½ x 8¾ in., cloth. Price:* $8.00.

Book is a well-balanced account of the properties and technical employment of the yeasts. It is based on a series of papers on principles and practice of yeast production, and is of particular interest to food technologists, chemists, and biologists engaged in the fermentation, brewing, and baking industries.

Up-to-date and offering detailed reports on experimentation, the work is illustrated with photographs and diagrams. Indexed according to subject and author, the book includes references at the end of each chapter.

Economics of Apples

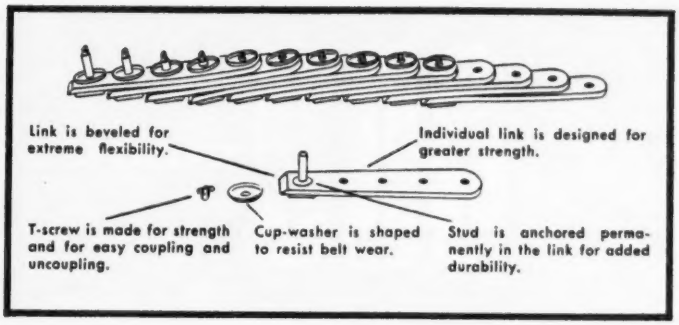
APPLES AND APPLE PRODUCTS. *By R. M. Smock & A. M. Neubert. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, 1954. 486 pages. 5¾ x 8¾ in., cloth. Price:* $9.75.

One of a series entitled "Economic Crops", the book presents data on the chemical composition, biochemical and physiological behavior, botanical aspects, and production of apples and apple products.

Chapters cover such angles as the history and distribution of the apple, varieties of apples, development and structure, fruit maturity and quality, storage, preservation, and processing. The appendix consists of a collection of tables giving valuable production data.

An author and subject index is included. Book is illustrated.

This detailed line drawing of the new Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job . . . easier!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▶ *easy* to couple and install

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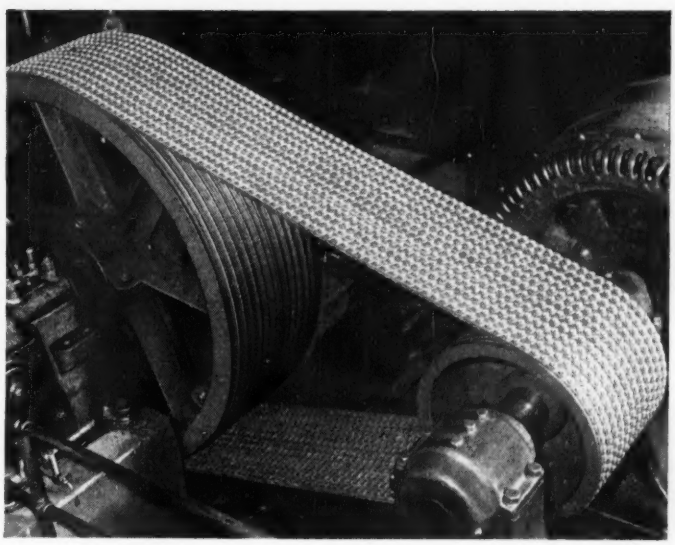

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Because even the smoothest looking piece of machinery can develop trouble—although Thermo King truck refrigeration has a stand-out reputation for solving problems instead of making them—the service organization behind it is of greatest importance to you. Your Thermo King sales engineer is always ready, willing and able to serve you. He has had many years of experience in transport refrigeration. He knows your refrigeration problems and how to solve them. When you install Thermo King units you will get regular visits from the Thermo King sales engineer. And for everyday service on every major truck route in the United States and Canada, you can call on the network of authorized service stations. These mechanics have been factory trained and are completely qualified. They are available 24 hours. This outstanding nation-wide service organization is your guarantee that your pay loads will arrive on schedule and in perfect condition.

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WORLD'S LARGEST BUILDER OF GASOLINE ENGINE POWERED REFRIGERATION UNITS

Olympia Brewery

—Continued from page 62

gas. These ensuing weeks develop a pronounced change in beer. The aroma and flavor mellows and matures noticeably.

"Kraeusen" Process

Used by Olympia, is the Kraeusen process. This serves two primary functions—produces a natural carbonation in the beer and imparts to the beer a full-body mellowness plus a delicate hop flavor.

The process basically consists of addition of a very small percentage of beer that is just starting to ferment into a large percentage of aged beer that has passed completely through the ruh stage. This further fermentation is carried on very slowly and at a much colder temperature (40 F.) than the usual fermentation temperatures employed in the fermenting cellar—and also under a pressure of 5-7 psi. CO_2. Low temperature and pressure causes the beer to retain CO_2 gas produced by this later fermentation and maintains this gas at the level of finished beer.

Finishing Process

Many tanks of Kraeusen beer go to make up a desired blend for the finished product, depending upon analytical and taste testing. At a rate of 200 bbl. per hour, beer from these tanks is put through a cooler to reduce its temperature to 29-31 F. and then through a diatomaceous earth filter.

For added quality control and to pin-point clarity control, during the filtering operation, beer is pumped through a continuous, recording photometer. The reading is transcribed on a continuous clock chart. The instrument is a direct-indicating, high capacity apparatus for the objective gage of absorption and turbidity according to the null method. (This "null method" being the optical compensation for uniformity of both measuring lines—representing measured solution and comparing solution.)

Beer then is stored in a standardizer or finishing tank at 29-31 F. for a period of 6 to 7 days. As it is pumped from the standardizing tanks, it once again is polish-filtered, this time through a 2-in.-thick cake of compressed cotton fibers. Then it is pumped either to racker, to be filled into kegs, or to bottling tanks.

The carousel keg conveyor has a total length of 1,080 ft. Traveling

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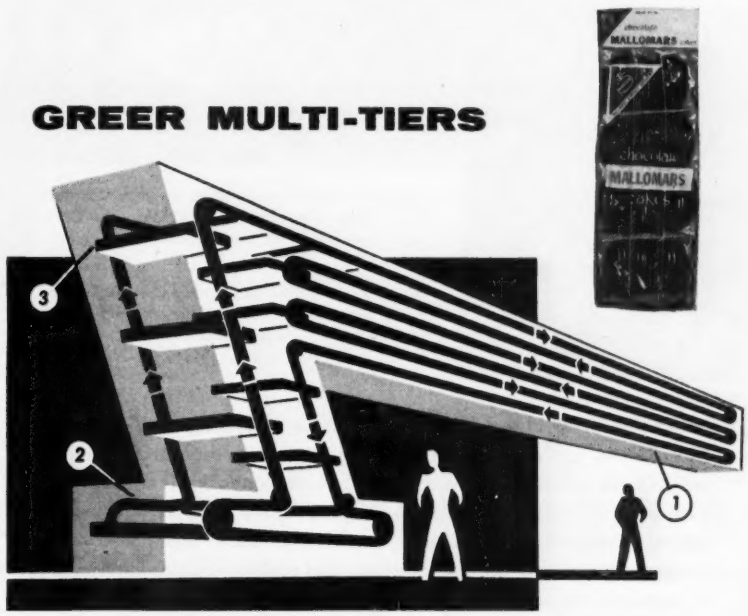

. . . a Multi-Tier will do the same for your products, too! . . . CONVERTS your heating, cooling, drying, and similar operations from batch to continuous processing. PROCESSES your products under exact time, temperature, and atmospheric control. HANDLING reduced to minimum.

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GREER

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Unusual

Air-Conditioning System at CORNING GLASS CENTER Served by DEMING PUMPS

Above view shows main entrance of the Corning Glass Center, established in 1951 by the Corning Glass Works at Corning, N. Y.

View at left shows the Deming Vertical Turbine Pump which serves the versatile air conditioning system at the Corning Glass Center.

Dedicated to the history, art and science of glass-making, the Corning Glass Center at Corning, N. Y., has been visited by more than a million people since its official opening in 1951. Maintaining proper temperatures throughout its multiple units requires an extremely versatile and flexible system of air conditioning. Cooling loads are unusually high and variable due to the glass walls, absence of shade, and constantly changing numbers of people in the numerous units of the Center.

A Deming Vertical Turbine Pump supplies water from a 100-foot well to the condensers. A system of chilled water circulated to conditioning equipment for each area or group of areas is used. Loads total approximately 300 tons and require circulation of an aggregate of approximately 100,000 CFM of conditioned air.

For complete information about the applications of Deming Vertical Turbine Pumps in air conditioning systems and for many other uses, write for Bulletin 4700.

THE DEMING COMPANY
556 Broadway • Salem, Ohio

Deming

VERTICAL TURBINE PUMPS

at 20 fpm., one carriage makes a round trip in 54 min. There are 360 carriages, spaced at 3 ft., designed to run around both vertical and horizontal bends.

The monorail conveyor consists of a rectangular steel tube, slotted at the bottom, through which runs a specially constructed chain equipped with wheels in both horizontal and vertical plane. Propulsion is by three tractor-type drive units of ½ hp. each located at strategic points. These restrict chain tension to 400 lb. pull or less. For instance, a drive is located at a downhill point to act as a brake and to split gravity pull of loaded kegs so as not to exceed maximum chain pull.

Drives are synchronized and start and stop simultaneously. They are controlled by push-button at the loading point and by messenger wire at the seven car spots.

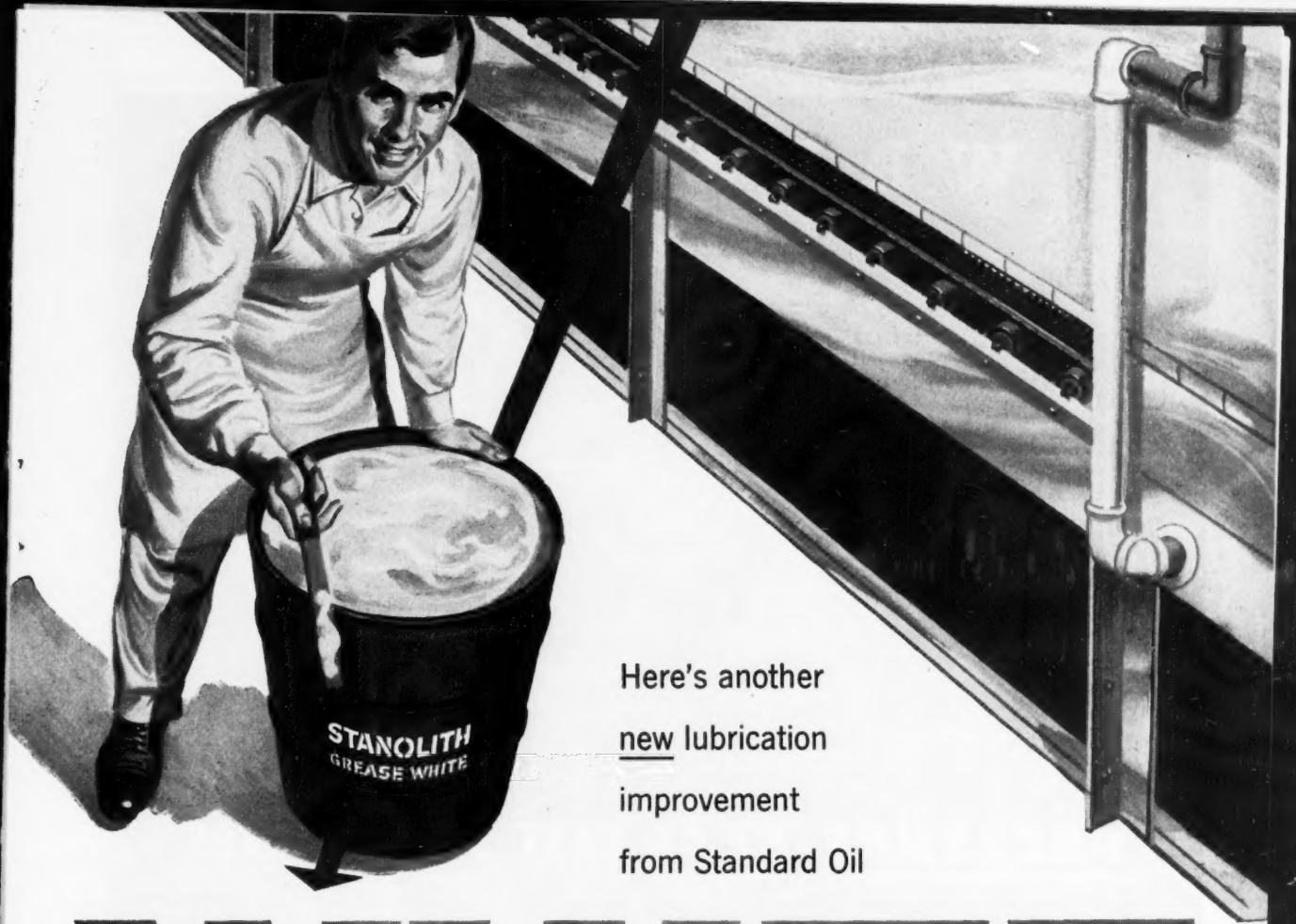
Carriages are suspended by four load pendants attached to four sets of vertical wheels on which the load is distributed. The pendants and their connecting bar are pivoted in both horizontal and vertical planes to allow travel of horizontal and vertical curves. The carriage is pivoted from the connecting bar in the vertical plane only to allow the keg to remain in a horizontal position.

At both loading and unloading spots, the upper part of the carriage runs between guides to keep it in a positive vertical plane. The carriage is hinged half-way down, and the lower half is allowed to swing sidewise to permit rolling a keg into or out of the cradles, attached to the lower half of the carriage. A roller wheel, on the bottom of the carriage, runs in a track and tips the cradles to the exact angle to receive or discharge a keg. The guides also keep the cradles in a fixed position so they are not displaced by shock of loading and unloading operations.

Speed of the conveyor is governed both by the rate that kegs are filled and the manual car-unloading of empty kegs. Filled kegs approach the loading point on a sloping track and are held either in a loading position or in a "batter-up" position by a racker-arm stop in the conveyor track. Alternate carriages are loaded with filled kegs.

Carriage pendants intercept an electric-eye beam at a short distance from the loading point properly selected with respect to the speed of the conveyor and the speed of a rolling keg.

The electric eye energizes a four-way hydraulic control valve, which in turn actuates the hydraulic piston to release a keg from the racker-arm for loading at the exact time for synchronization. This releasing operation



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WHITE

NEW STANOLITH GREASE

A new grease! White and clean in appearance, STANOLITH Grease White is the perfect grease for use in food and beverage plants.

Specially recommended for bakeries, breweries, candy factories, canning and cereal plants, chemical processing plants, dairies, distilleries, meat processors — all industries where clean, sanitary operating conditions are at a premium.

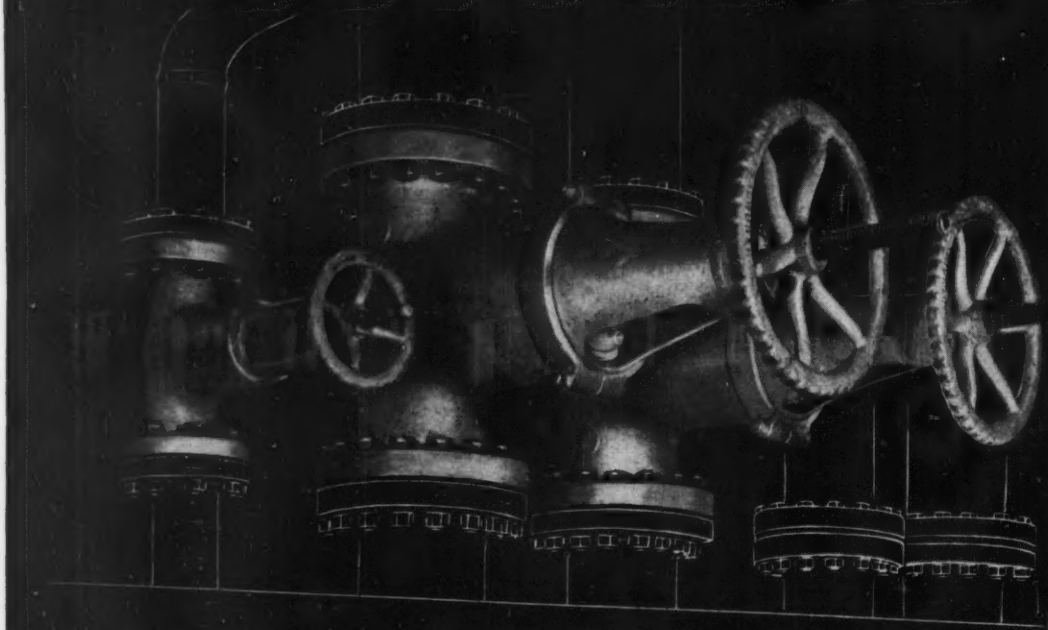
● STANOLITH Grease White is a new high quality, multi-purpose lithium soap grease with a clean, white color. It assures you of unmatched lubricating cleanliness *plus* unmatched lubricating efficiency.

In addition to the high-temperature and water resistant properties, characteristic of most lithium greases, STANOLITH Grease White has superior mechanical and chemical stability. It provides a water-resistant lubricating film that gives this remarkable grease extended multi-purpose usage in a wide variety of applications. Easily handled in all usual types of grease-dispensing equipment, it is safe, easy-to-use, clean. Call your nearby Standard Oil lubrication specialist for full details on new STANOLITH Grease White.

STANDARD OIL COMPANY *(Indiana)*

STANDARD

WALWORTH

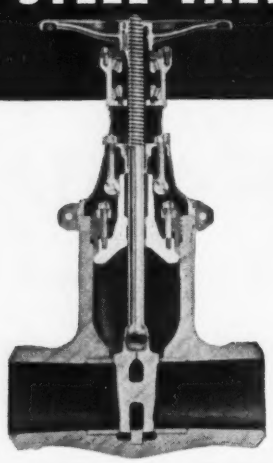


PRESSURE-SEAL CAST STEEL VALVES

Better because ... **They have no bonnet flanges, bonnet bolts, or bonnet welds. Ideal for high-pressure, high-temperature steam service and corresponding boiler feed service, Walworth Pressure-Seal Cast Steel Valves weigh less, and take up less space than the flanged bonnet type of valves used for similar services.**

These are a few of the important advantages made possible by the design of Walworth *Pressure-Seal* Cast Steel Valves. Internal line pressure is utilized within the bonnet to maintain a tight, leakproof, body-to-bonnet connection under all normal operating conditions. The higher the pressure, the tighter the seal.

Ask for your copy of Walworth Circular 143. It gives detailed information, including sizes, dimensions, and specifications for all Walworth Pressure-Seal Cast Steel Valves.



Cross section of 8-inch Series 900 Walworth Pressure-Seal Cast Steel Gate Valve. Pressure-Seal Globe, Check, Angle, and Non-Return Valves are also available in Series 600, 900, 1500 and 2500 in a wide range of sizes.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

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simultaneously holds the next keg in the "batter-up" position. The next carriage on the conveyor again intercepts the electric eye which, through the use of a sequence relay for reversing the hydraulic piston, puts the "batter-up" keg in the batter's box and allows the next keg to roll into the "batter-up" position—thus, loading every-other carriage.

The full keg unloading is accomplished simply with a cam that contacts the roller wheel at the bottom of the carriage and tips the cradle at the proper time to allow the keg to roll off onto a track and directly into the car.

Empty kegs are handled entirely by hand, placed on each carriage as it goes past the car doors and removed by hand in the keg washing department. Loading and unloading operations can run simultaneously.

Draught beer is packaged in 15½ gal. stainless steel kegs by a four-arm racker. Kegs automatically are washed and sterilized on a 15-station keg washer. Each keg is rinsed thoroughly with hot water, outside surfaces are scrubbed, rinsed and drained again, get two hot sodium-hydroxide sterilization rinses, a water rinse, two steam sterilizations, and are properly drained.

The ten refrigerated tanks housed in the bottling cellar have a total capacity of 2,000 bbl. Beer is forced from these tanks to the filler head by CO_2 gas counter pressure.

Sealed tin or glass containers are pasteurized by means of heated water spray. The product temperature is brought gradually to 140 F., held for 13 min., then dropped to 70 F. by cold water spray.

Each container is thoroughly inspected after pasteurization. Ten rotary type labelers and three automatic packers handle the bottlehouse production.

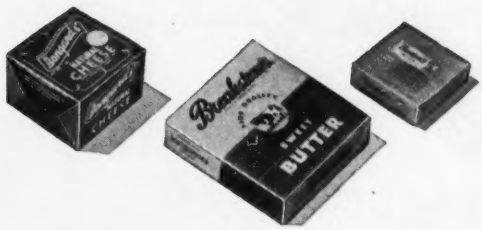
Among many carefully supervised quality control phases within the process and not mentioned in the text, four merit final reference:

1. The laboratory staff analyzes all incoming shipments of grain for optimum yield, quality, appearance, etc.

2. To insure uniformity of the "character" of beer, a pure yeast culture apparatus is employed. The machine consists of a highly polished stainless steel sterilizer and propagator.

3. In conjunction with rigid laboratory analyses, regular and periodic taste testing is an important facet of quality control. Taste testing is done by a panel of carefully selected and trained technical men.

4. A pilot plant within the brewery is designed to emulate conditions and the activity of the brewhouse, fermenting and aging cellars. The model brewery's capacity is half-barrel (15½



YOU CAN TELL
A HAYSSEN-WRAPPED PACKAGE
BY THE WRAPPING IT KEEPS!

easy, automatic operation

Regardless of size or shape, you get a neat, tight wrap on every package with a Hayssen automatic wrapping machine. *Wrapping's easier!* Also, production men report savings up to 80% over previous wrapping costs.

simple to adjust

No complicated adjustments from size-to-size on a Hayssen. No gears or sprockets to remove or change . . . no need for expensive mechanics to change size, either. So simple the operator does it on the job.

more sturdily built

Hayssen's simple, rugged design, using fewer moving parts, keeps these machines working and saving through years of dependable, trouble-free service. Every moving part is in the open and easily reached for maintenance and cleaning.

Since 1910, manufacturers exclusively of automatic wrapping machines for textiles, paper, frozen foods, meats, vegetables, and many other products. Whatever your product, Hayssen can solve your wrapping problem. WRITE today for more information.

Hayssen MFG. COMPANY
Dept. FE-6, SHEBOYGAN, WISCONSIN

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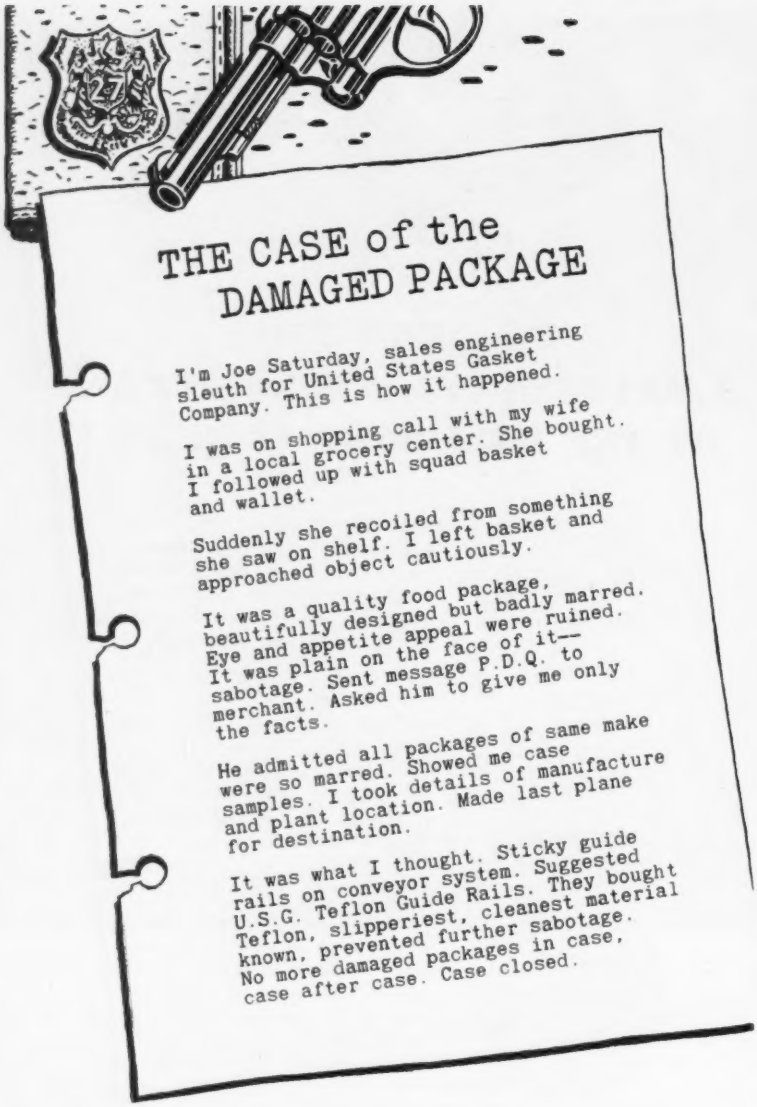
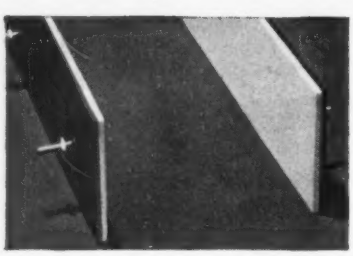

THE CASE of the
DAMAGED PACKAGE
I'm Joe Saturday, sales engineering sleuth for United States Gasket Company. This is how it happened.
I was on shopping call with my wife in a local grocery center. She bought. I followed up with squad basket and wallet.
Suddenly she recoiled from something she saw on shelf. I left basket and approached object cautiously.
It was a quality food package, beautifully designed but badly marred. Eye and appetite appeal were ruined. It was plain on the face of it— sabotage. Sent message P.D.Q. to merchant. Asked him to give me only the facts.
He admitted all packages of same make were so marred. Showed me case samples. I took details of manufacture and plant location. Made last plane for destination.
It was what I thought. Sticky guide rails on conveyor system. Suggested U.S.G. Teflon Guide Rails. They bought Teflon, slipperiest, cleanest material known, prevented further sabotage. No more damaged packages in case, case after case. Case closed.



Guide rails are fabricated in any length up to 12 feet long. Widths are from ½" up to 2½" in ¼" increments. One-eighth inch TEFLON is bonded on one-eighth inch steel bar by a special patented, U. S. Gasket technique and shot-welded studs are applied at designated points for fastening to present conveyor equipment. The TEFLON surface remains unmarred. Special shape guide rails are also available to specification.

Write for further information.

UNITED STATES GASKET COMPANY

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FABRICATORS OF duPont TEFLON, Kellogg KEL-F AND OTHER PLASTICS

Representatives in Principal Cities Throughout the World

gal.) brew. One assistant brewmaster handles all phases of this operation. The plant acts as a practical research tool in the continuous search for economical means of controlling nature in the processes of brewing beer.

End (*Resume reading on page 63*)

Care for Machines

—*Continued from page 65*

attempt to differentiate them on an experience basis. Each group was assigned a machine to overhaul and repair under instructor guidance.

At key stages in the instruction, service tips are specified. For instance, relative to the photoelectric circuit—see Fig. (15)—the following kind of procedure is outlined:

1. Turn on eye-panel switch. Check to see tubes are secure in sockets. Points L and M—see Fig. (12)—should be closed. Connect terminal 3 to terminal 10 momentarily. If FG-17 glows, power circuit is okay and trouble is in phototube or amplifier.

2. Insert D.C. (0-5 range) milliammeter in jack plug A—Fig. (9). Light change under scanner should show strong reflection on meter needle; if none, replace 6J7 and phototube. Recheck scanner alignment—Fig. (6).

3. If FG-17 does not glow after procedure 1 (above), replace tube. If it still does not glow remove external wires from terminals 13 and 14 and connect a 30 w., 4,000 ohm resistor across terminals. If FG-17 now glows, plate points are open, and magnet, or circuit to magnet, open. Check for 'open' with ohmmeter.

4. If still no glow after procedure 3 (above), shunt terminals 9 and 10. If FG-17 glows, grid points or grid circuit is open. Use ohmmeter to check.

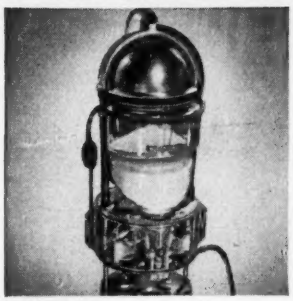
School Arrangements

Since these schools serve worthwhile objectives for both the machinery sales company and the frozen food plant operators, only a small "registration fee" is charged the students. The Fred Todt Co. supplies three men to teach a school while the customer provides the facilities, receiving in exchange a free overhaul of his machine. Individual plants maintain their men while attending the school.

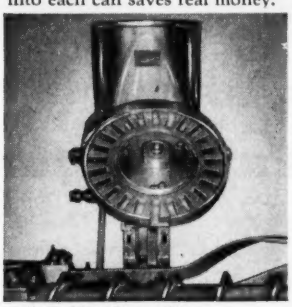
Our schools specifically were organized in an effort to minimize the service calls on machines. Results have been so satisfactory—both for the equipment company and the food freezers—that this training is recommended as a pertinent means of improving operation and maintenance efficiency of other machinery.

MORTON

for all your canning salt needs



Bulk Salter
For precision salting by the economical bulk method. Designed for either plant-blended mixtures or quick-dissolving Morton Salt. Buying salt in bags and dispensing accurately metered amounts into each can saves real money.



Salt Tablet Depositor
Deposits *one* tablet in *each* can at high speeds with never-fail accuracy. The tablet depositor enables the canner to get the *exact* amount of salt, or other made-to-order mixtures, into each and every can.

Saturated high purity brine piped anywhere in your plant!

The Morton Brinemaker delivers up to 800 gals. of clear, fully saturated brine an hour, using the type of salt that is most economical or best suited for each plant. Saves labor and time—the brine can be pumped under pressure from ground floor to upper levels, or anywhere in your plant!

Morton has a salt to meet the requirements of *your* particular operation, now available from 9 strategically located plants. These specialized canning salts include *Morton* 999, a high purity salt; *Morton H. G. Granulated,* a screened high grade evaporated salt of controlled purity, quality and uniformity; *Morton K. D. Granulated,* a superior quality of evaporated salt; and *Morton Rock Salt.* A Morton Consulting Engineer will be glad to recommend the salt best suited for your needs.

UP TO 800 GALLONS OF BRINE AN HOUR

—available when you want it!

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Industrial Division
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Chicago 3, Illinois

I would like information on:

☐ *Morton Canning Salt* ☐ *The Brinemaker*
☐ *The Bulk Salter* ☐ *The Salt Tablet Depositor*

Name and Title _____
Firm _____
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(Brinemaker not available on West Coast) EB6

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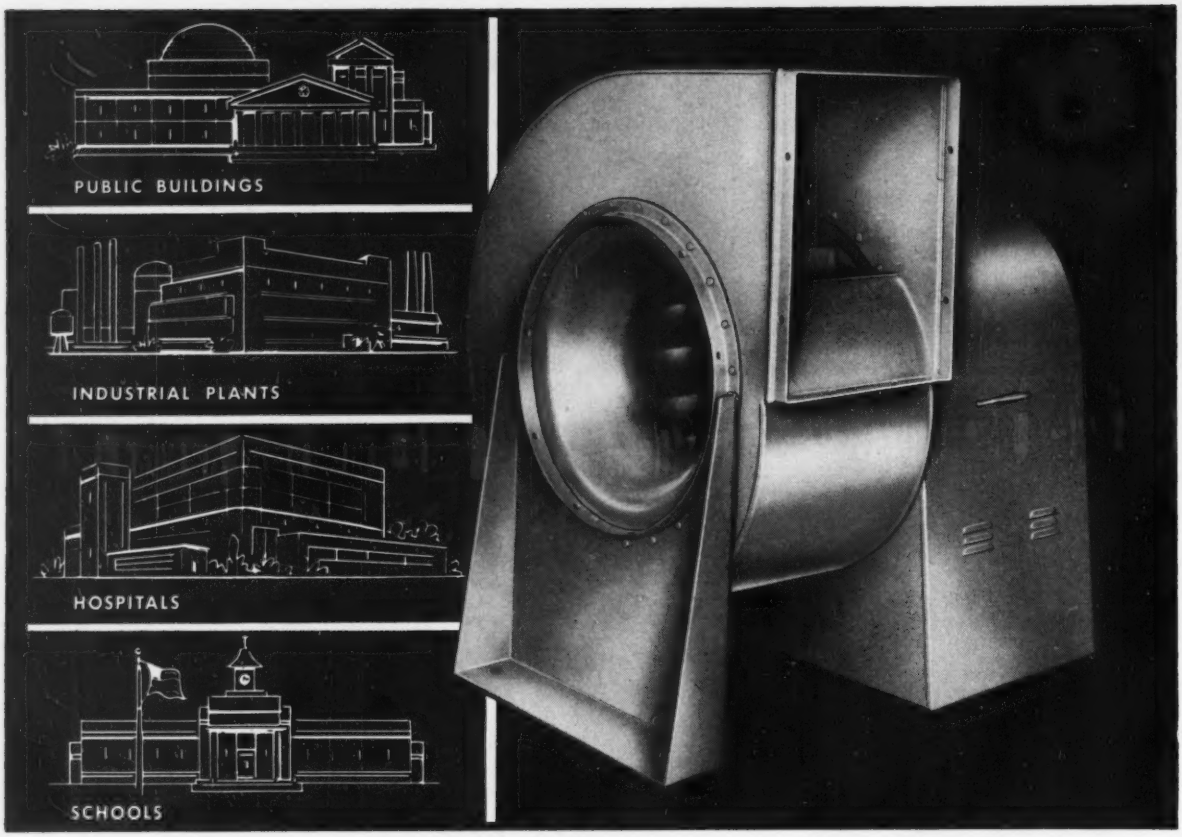


Quiet, Compact Westinghouse Ventilating Sets are Seven Ways Better!

In industrial plants, schools, hospitals, public buildings—wherever quiet, low-cost, reliable ventilation of small to medium areas is required, check the features of Westinghouse Ventilating Sets before you specify. Only Westinghouse offers all seven of these benefits:

1. *Low power consumption*, thanks to wheel designs that combine top efficiency with large capacity
2. *Simple installation* because these compact fan-motor units are miserly with space, easy to set up
3. *Extra-quiet operation* because carefully designed inlets give smooth, steady airflow
4. *Convertible air discharge*—as you want it, when you want it, even after initial installation
5. *Weatherproof covers* that keep these units dry and clean when mounted outdoors
6. *Trouble-free operation* that cuts maintenance, permits installation in out-of-the-way locations
7. *Exclusive warranty* that only Westinghouse-Sturtevant can offer because of undivided equipment responsibility

Westinghouse Ventilating Sets are available now either direct-connected for volumes from 150 to 3200 cfm, or v-belt driven (illustrated above) for volumes from 375 to 14,400 cfm. Wheel diameters range from 6 to 30 inches. Ask your Westinghouse-Sturtevant representative for further details. Get catalog 1160. Write: Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE ... IF IT'S Westinghouse

J-80409

For more information, use coupon on page 181.

KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

New Juice-Freeze Method

Citrus concentrates with superior taste and keeping qualities are said to result from application of a new "freeze concentration" process recently described by Dr. J. B. Redd, Florida Chemists & Engineers, Inc., Orlando.

Method combines freeze and low temperature concentration. In it, juice is slush frozen, then passed through separators to remove high-ester juice containing approximately 30% of natural flavor solids. Ice is melted, flash heated to 165-170 F. for 6-8 sec. to inactivate pectinesterase, practically all of which remains in the ice, and concentrated in standard low temperature evaporator of the type used for juices.

Concentrate and high-ester juice are blended to give a product claimed to contain much more of the flavor esters than standard citrus concentrate.

Also, inactivation of the pectin-splitting enzymes is said to eliminate separation.

MSG Best in Neutral Foods

All brands of monosodium glutamate work best with foods that are slightly acid or chemically neutral according to Prof. I. S. Fagerson, Dept. of Food Technology, University of Mass.

Under these conditions the substance exists in a chemical form that he calls R-3, which stimulates the taste buds thus producing a "feeling of satisfaction."

At pH values less than 4 or more than 9½, Prof. Fagerson found that MSG had virtually no effect on flavor, because the R-3 ion form is converted to other ions that do not enhance flavor.

Speedy Milk Test

Rapid determinations of butterfat content of milk is seen possible with application of a new metal powder. Recently announced by Chemalloy Associates, Santee, Calif., the powder can electrify any liquid or moist material, causing generation of both alternating and direct current.

When it is mixed with milk, there are emitted different electrical responses for different fat contents of the product.

Role of Brewing in Gaging New Malts, Flavor Factors, Accented at ASBC

Pilot-plant brewing and flavoring substances of beer were among prime subjects discussed at technical sessions of American Society of Brewing Chemists' 20th Annual Meeting in Milwaukee, May 9-13.

Dr. Evald Sandegren, of the Stockholm Brewery, Stockholm, Sweden, was special guest speaker.

Actual brewing of beer was termed a necessary final test of quality for malts produced from new barley varieties, or by variations in malt house practices. Probably the newest pilot plant for this purpose is the "40 barrel" brewery of Froedtert Malt Corp., Milwaukee, described by Dwight L. Baker in a paper, *Pilot Brewery Design for Malt Research.*

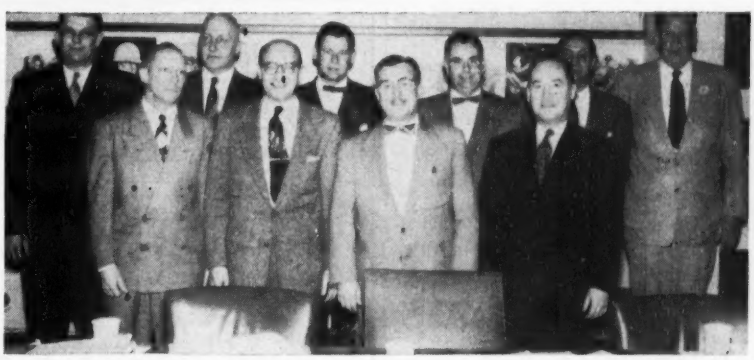
Unit is designed to produce two cases of beer a day. Cooking and mashing operations are thermostatically controlled, and the water-jacketed, glass-walled lauter tub is designed to give a grain depth similar to that prevailing in full-scale equipment. The glass walls permit observation of grains settling by time-elapsed photography. The kettle is a pressure vessel in which effects of hydrostatic head in the depths of a large brewery kettle may be reproduced.

A double-tube wort cooler is used, provided with taps at the ends of each turn for insertion of thermocouples or air jets. Fermenting and storage tanks are interchangeable, horizontal, stainless steel pressure tanks. Filtration and bottling units are mounted on carts for operation at any point in fermentation or storage cellars, or in the adjacent laboratory. Pasteurizer takes two cases and is automatic.

A series of brews in which malts of different degrees of modification were used in the pilot-plant brewery of The Kurth Malting Co., Milwaukee, was discussed in a paper by J. W. Fitzsimons and Eric Kneen, *Influence of Malt Modification on Pilot Brewing.* Increased modification of malt was indicated by its higher soluble protein content, greater diastatic power, increased alpha-amylase activity, and reduced wort viscosity.

Fermentability of worts increased with modification of malt, the resulting beers had somewhat higher protein content, and their protein stability was slightly improved. Beer foam and pH were not significantly changed, though wort pH figures were slightly higher for overmodified malts. Chief effect of increased modification is in brewhouse behavior.

Extending their studies on sulfur



Eye QM Soups and Gravies

Food industry men now are in action on the new Research & Development Advisory Committee on Soup & Gravy Bases of the QM Food & Container Institute, Chicago. Front row (l. to r.): A. C. Edgar, Wilson & Co.; H. C. Needle, Universal Foods Corp.; and T. C. Kmieciek and K. T. Farrell of QM. Back row: A. J. Harriman, Thomas J. Lipton, Inc.; G. F. Hansen-Sturm, Romanoff Caviar Co.; F. W. Lanigan, Nestlé Co.; L. J. Minor, L. J. Minor Corp.; M. J. Sintov, Fearn Foods, Inc.; and P. J. Kelley, Chicago QM legal officer.

FORWARD!

by

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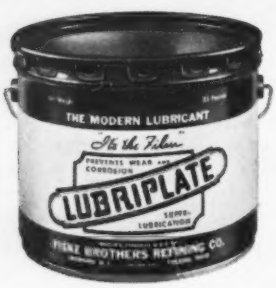


IFT'ers Will "Yardstick" Food Engineering

Integration of food engineering with food technology and science specially will be spotlighted in the Food Engineering Symposium to be held July 1 at the annual meeting of the Institute of Food Technologists in Los Angeles.

With Curtis E. Maier, of Continental Can Co. as chairman, this timely program will lead off with *The Team —The Food Engineer and the Food Technologist*, by Frank K. Lawler, Editor, FOOD ENGINEERING.

There will follow *Engineering Aspects of Food Production Unit Processes*, by Paul C. Wilbur, Food Machinery & Chemical Corp.; *The Inter-relationship of Science, Technology, and Food Engineering to the Technical Success of Food Production*, by William R. Johnston and Lawrence Atkin, of Fleischmann Laboratories, Standard Brands, Inc.; and finally *The Food Engineer and Food Industry Profits*, by Raymond Stevens, Arthur D. Little, Inc.

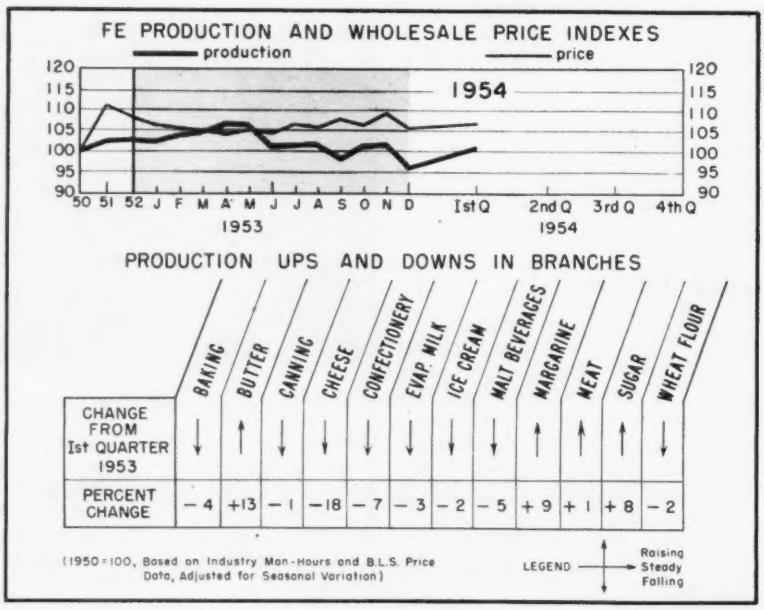
Continuing in the afternoon, the symposium will be rounded out with: *Engineering Aspects of Food Preparation in the Canning Industry*, by Alan Richardson and Bruno Pilorz, California Packing Corp.; *Evaporation in the Production of Major Food Products*, Vernon C. Praschan, Clinton Foods, Inc.; and *Engineering Aspects of Food Packaging*, Laurence V. Burton, Packaging Institute.

Then the curtain feature will be a panel considering *Instrumentation in the Modern Food Plant*. Moderated by William J. Scarlett, Minneapolis-Honeywell, it will be highlighted by *Application of Measurement Principles in Instrumentation*, by Alvin J. Fink, Taylor Instruments Cos.; *Types of Instruments and Their Application*, by Lyle M. Richardson, Food Industries Div., The Foxboro Co.; and *What's Ahead for Instrumentain Food Industries*, by Ernest C. Clement, Mars, Inc.

compounds in beer that were begun last year, M. W. Brenner, J. L. Owades, Marcia Gutcho, and Ralph Golyzniak, Schwarz Laboratories, Inc., Mount Vernon, N. Y., presented the third of the series, *Determination of Mercaptans*. Beer has been found to contain 0-30 parts per billion of sulfhydryl (SH), which is probably present as some of the simpler mercaptans, or metal mercaptides.

Thioglycollic acid does not seem to be present. Exposure of beer to light increases mercaptan sulfur content without raising H_2S level. Oxidized mercaptans contribute a "cardboard" or "papery" taste, somewhat similar to that obtained in beer after long exposure to air. Estimation of mercaptans depends on conversion to H_2S by boiling with colloidal sulfur in neutral solution, sweeping the H_2S into a zinc acetate trap with nitrogen, and final conversion to methylene blue by means of p-aminodimethylaniline. Intensity of the methylene blue is measured colorimetrically.

Dr. Sandegren's paper, *Amino Acids in Brewing*, discussed changes in level of free amino acids of barley through malting, mashing, and fermentation into finished beer, as well as experiments in which D, L-aspartic acid, tagged with carbon-14, was the



only source of nitrogen involved.

Most of the free amino acids of barley persist into finished beer, but in varying proportions, the changes being associated with those acids such as aspartic acid, arginine, glutamine acid, and lysine, known to be active in protein synthesis. One amino acid, gamma-aminobutyric acid, possibly the result of decraboxylation of glutamic acid, increases during fermentation. Radio-active D, L-aspartic acid is only 46% used by yeast when it is the sole source of nitrogen, whereas the non-radio-active form is used completely, suggesting that, in this case, radio-activity interferes with normal assimilation.

In presence of wort nitrogen it is used completely, however. In either case radioactive CO_2 (accounting for about half of the amino acid) is produced, indicating that aspartic acid is not assimilated completely as has been supposed.

Fermentability of wort can be predicted accurately from total carbohydrates in acetone-soluble fraction,

Hors d'Oeuvres

▶ Victor Borge, the Danish pianist who gets belly laughs out of Bach, has dreamed up a new kind of potato. It's a cross between an Idaho and a rubber sponge. "Tastes awful," he says, "but it sure holds a lot of gravy."

▶ Borge's other interest in food is a guinea hen and pheasant farm in Connecticut—not for laughs, either.

▶ After sampling wine salvaged from a Greek ship sunk in 230 B. C., a French sea captain made this report: "I have tasted all the mustiness and age there is in this world."—Off the Hedonic scale.

▶ Research indicates that addition of animal fats to feed for cattle, lambs, and hogs fattens the animals faster. Good. A new outlet for surplus butter.

▶ Sales of Betty Crocker cake mixes were three times as great last year as in 1949. This increased volume has led to a price cut which will boost sales still more. Nothing succeeds quite as much as success.

▶ What with olive sizes ranging from "Small" through "Mammoth" to "Super Colossal", you would think nothing more could be added. But blends of various sizes now have been designated "Family", "King," and "Royal." A colossal bit of classifying.

▶ Cocoa beans have increased 1,000% in price since 1941, so candy technologists are paying more attention to non-chocolate coatings. And the peanut joins chocolate as a very expensive ingredient—thanks to the support program. Glad we were a kid when confectioners could afford to make candy.

STEEL

Every kind in stock

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Another Large Firm Adopts

$35 NICHOLSON TRAPS AS TEMPERATURE CONTROLS

Because they serve effectively as temperature controls as well as steam traps, and cost only about $35, Nicholson expansion steam traps are being increasingly installed in place of temperature regulators. A large processor recently installed these Nicholson units on outdoor storage tanks after thorough tests showed a less than 2°F variation in outlet condensate temperature. Regulators had been costing them $110.00 to $200.00, with cost of a trap added.

Nicholson expansion steam traps are easily adjusted to pass condensate at any temperature below 212°F. Because there is only one moving part, remarkably low maintenance costs are being shown. Easily installed, usually without supports. Lengths, 9" to 40". Pres. 0 to 250 lbs. Freezeproof.

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Dryers	Rendering Tanks
Evaporators	Sterilizers
Crystallizers	Retorts
Juice Heaters	Washers
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Pasteurizers	Storage Tanks

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193 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

For more information, use coupon on page 181.

LA PORTE FLEXIBLE STEEL CONVEYOR BELTING

La Porte's husky, interlocking steel mesh construction provides you with a smooth-flowing belt system that withstands shock and loading impacts. The open mesh also assures greater resiliency so that belt stretch is no longer a problem. Easier to clean, too, with steam gun or scalding water.

La Porte Belting FLEXES—grips the friction drum more firmly, eliminating slippage, weaving, jumping. Provides perfectly flat surface for containers, *empty or filled!* Easily installed. Easily lengthened or shortened without rivets. Available in any length, practically any width.

Ask your dealer for literature, prices—or write to

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

You get the **Best Protection** when you use

Mundet Cork Insulation

There is nothing like Cork—nature's own insulation! Because of its natural, inherent insulating qualities, Cork is the accepted *standard of comparison* when insulating performance is considered. Mundet selects its raw cork from the world's best rated cork growing centers . . . fabricates it by the most modern methods for low temperature applications. Available in pipe covering or corkboard.

MUNDET CORK CORPORATION
Insulation Division
7301 Tonnelle Ave., North Bergen, N. J.

Without obligation, send me your insulation manual, describing Mundet Cork Insulation Products.

NAME.....

FIRM.....

ADDRESS.....

Mundet Insulation Products include: "Custom-Molded" 85% Magnesia Pipe Covering; Magnesia Blocks and Segmental Covering; High Temperature Pipe Covering and Blocks; "Jointite" Cork Pipe Covering and Corkboard

determined by anthrone colorimetry. Results agree very well with those obtained by paper chromatography of worts and beers for total and residual carbohydrates, and with the rapid fermentation procedure of A.S.B.C. Methods of Analysis. These results were presented in the paper *A Simplified Method for Determining the Fermentable Sugars of Wort*, by W. D. McFarlane, H. R. Held, and G. Blinoff, Canadian Breweries, Ltd., Toronto.

Spoilage organisms in beer produced under carefully controlled brewery operations, require relatively mild pasteurization conditions, less than 1 P.U. (pasteurization unit), and possibly as low as 0.4 P.U. Commercial pasteurization of beer therefore has a factor of safety of at least 3, according to the paper *Thermal Death Time Studies on Beer Spoilage Organisms—III*, by F. C. Baselt, American Can Co., C. A. Dayharsh, and H. W. DelVecchio, Jacob Ruppert, Inc., New York City.

Inhibition of germination by steep liquor, obtained when barley is soaked to moisten it for growth during malting, is probably due to toxins elaborated by bacteria, though substances extracted from barley may have some effect.

These results were reported by Seymour G. Gilbert, Peter H. Blum, and Alexander Frieden, Pabst Brewing Co., Milwaukee, in their paper, *The Inhibition of Barley Germination by Steep Liquor*.

They also found the barley sterilized with 2% peracetic acid, or 0.5% mercuric chloride, gave a non-toxic steep liquor, while filtrates of bacterial cultures isolated from steep liquors were highly toxic, even when non-barley media were used. The toxin appears to be a salt of a high-molecular-weight organic acid.

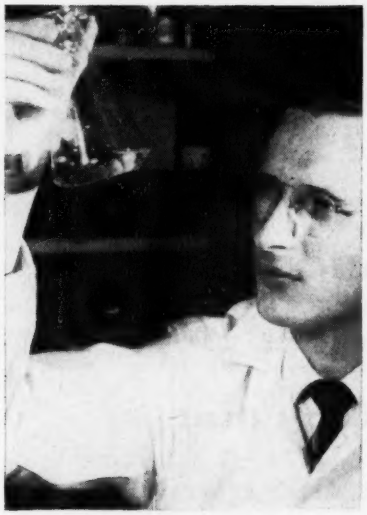
Leaders for New Year

Officers for the ensuing year are Kurt Becker, president; Ulysses C. Gramsch, president-elect; F. C. Baselt, vice-president; George E. Bredt, secretary; E. L. Roth, treasurer; M. W. Brenner, chairman of technical committee; and W. J. Olson, executive secretary. The 1955 meeting will be held in Philadelphia, early in May.

Injury Rises Reflected

Final report on the companies participating in the 1953 Food Section Safety Contest, conducted by the National Safety Council, shows a number of ups in injury frequencies, as overall man-hours rose 2% over '52.

Breakdown: Div. I, Grain Handling



Lab-Made Mushrooms

Gourmet-prized mushrooms of the flavorful *Morchella hortensis* type now have been laboratory-cultivated in four days at Syracuse U. Here, a batch of the new tid-bits—produced somewhat like penicillin—are examined by Researcher C. F. Koda.

Attempts to grow this species in beds, like commercial variety, *Agaricus campestris*, have been unsatisfactory. Unlike natural kind, this lab product is a small cream-colored ball. Its use on steaks, in soups, and as a powdered seasoning is predicted.

Cultivation is by chopping microscopic bits of fiber that make up most of mushroom. Then each fragment is put in a glass tank holding a nutrient solution that is kept in constant agitation with compressed air. Resulting tiny mushroom balls can be chopped to grow others.

& Processing, up 6%; Div. II, Prepared Foods, up 6%; Div. III, Dairy Products, up 17%; Div. IV, Preserved & Canned Foods, up 2%; Div. VIII, Breweries, up 7%. Other divisions: V, Fluid Milk, up 3%; VI, Tobacco, up 12%; VII, Distillers, down 16%.

Cereal Chemists Elect

Named to the presidency of American Assn. of Cereal Chemists for '54-'55 is W. F. Cathcart, director of research, National Bakery Div., Great Atlantic & Pacific Tea Co., New York City. And taking post of treasurer for a third term is D. B. Pratt, technical director, Omar Bakeries, Inc., Omaha.

The elections, held at Association's recent national gathering in Denver, included terms on the executive committee for S. Brockington, supervisor, Product Control Div., Quaker Oats Co., Chicago, and R. B. Potts, director of research laboratory, Wichita Flour Mills Co., Wichita, Kan.

Depend On Morningstar For Food Starches And Thickening Agents

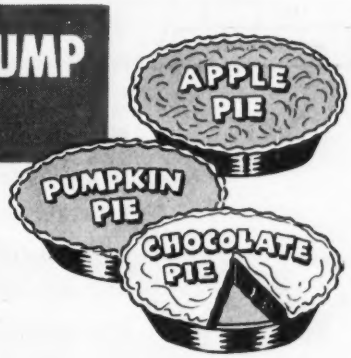
POTATO STARCH
ARROWROOT FLOUR
TAPIOCA FLOUR
STARCHES & DEXTRINES
LOCUST BEAN GUM
GUM TRAGACANTH
GUM ARABIC · KARAYA

MORE and more Food Product Processors are depending upon us for Food Starches and Thickening Agents. Direct importers and manufacturers, we can ship quickly and economically in any quantities from a few 100 pound paper bags to many carloads. MORNINGSTAR Products are scientifically prepared and laboratory controlled to precise standards of *uniform* fine quality. They'll add new appeal to many foods. MORNINGSTAR, NICOL, INC., 640 West 51st Street, New York 19, New York; 1780 Canalport Avenue, Chicago 16, Illinois.

MORNINGSTAR, NICOL, INC.

Scientific Starch, Dextrine and Natural Gum Service

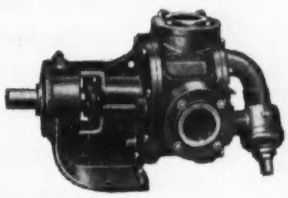
What's a VIKING PUMP Doing Here?



Whether it's the house wife or chef, the success of the pie depends on good shortening and delicious fillings and sweetenings.

Both the shortening producer and the food supplier furnishing the pumpkin, pineapple, chocolate, sugar, etc., depend on Viking Pumps to help them retain their consistently high quality.

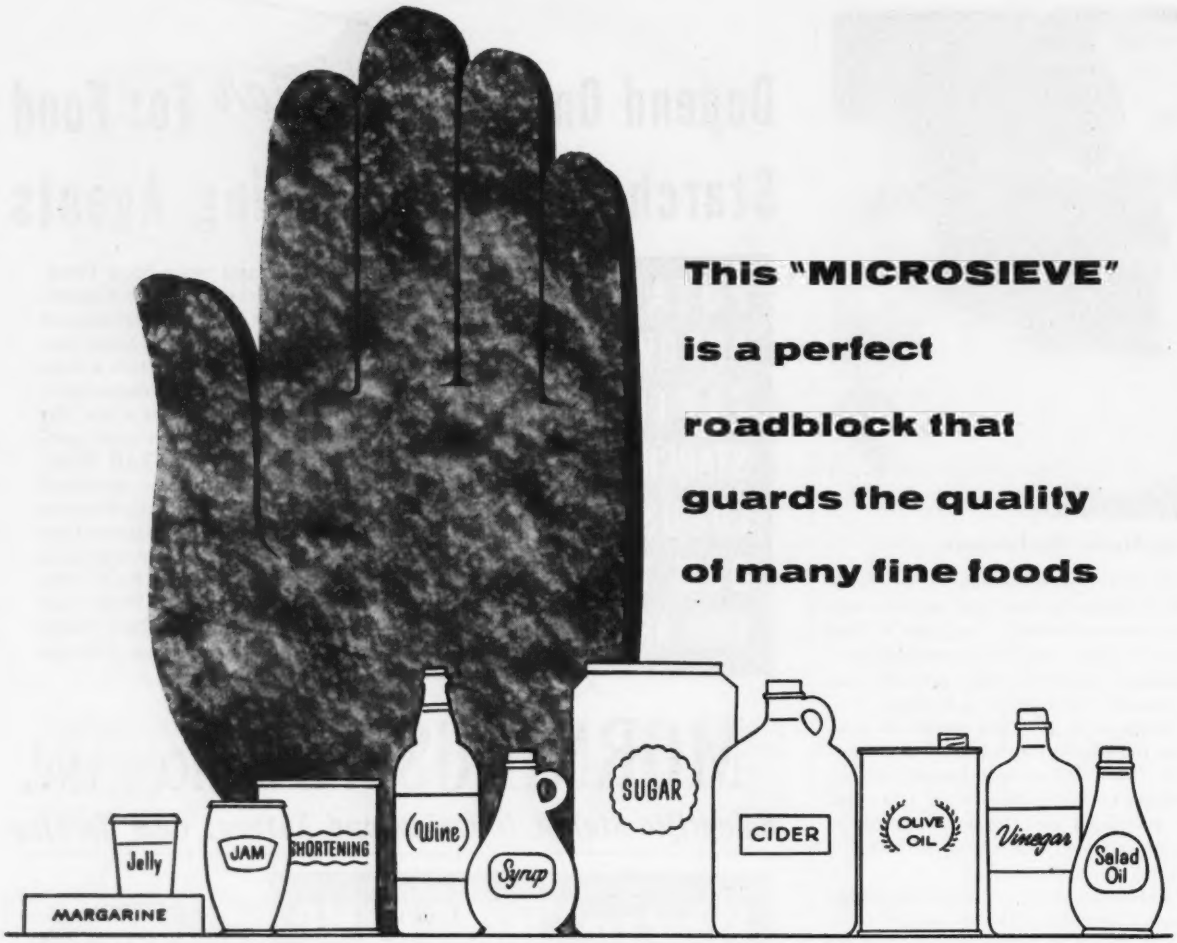
The positive, smooth action of Viking pumps make it possible to move these liquids and semi-solids without pulsation or agitation. From over 600 standard models and many special units, they are able to use the RIGHT pump for THEIR Job. You can do the same.



For additional information on Viking pumps, ask for bulletin series 53S.

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

THE ORIGINAL "GEAR-WITHIN-A-GEAR" ROTARY PUMP



This "MICROSIEVE" is a perfect roadblock that guards the quality of many fine foods

No unwanted solids can pass this Dicalite filtercake—yet you get high throughput for full production. The reason is simple: only 10% of the filtercake is solid; 90% is voids, voids so tiny that even particles down in the colloidal and bacterial range can't get through. Decolorizing clays and activated carbon are caught and held; every trace of catalyst is removed from hydrogenated oils and fats.

For brilliant clarity and purity of filtered liquids; for greater stability of finished product; for lower filtering costs; Dicalite Filteraids have no superior. Impartial laboratory tests and the experience of many food processors support this statement. Dicalite Filteraids are produced from the nation's highest-grade deposits of diatomite and are processed under strict quality controls to set a new high standard of excellence in diatomaceous filteraids.

For more complete data on filtration, write for Bulletin B-12.

Dependable GREAT LAKES **Dicalite®** DIATOMACEOUS MATERIALS

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION, 612 SOUTH FLOWER ST., LOS ANGELES 17, CALIFORNIA

For more information, use coupon on page 181.

Wins Candy-Tech Award

The Fourth Stroud Jordan Award, given by the American Assn. of Candy Technologists, has gone to Justin J. Alikonis, director of research of Paul F. Beich Co. and director of Al-Chem Labs, Inc., both of Bloomington, Ill.

Mr. Alikonis was cited for his practical research, involving raw materials and processes that have resulted in more efficient production, improved product quality, and longer shelf-life of goods.

His services to AACT, of which he currently is president, were particularly hailed, also his contributions to work of the Army QM and National Confectioners' Assn. Further noted was his constant stimulation of others in original candy-technology thinking.

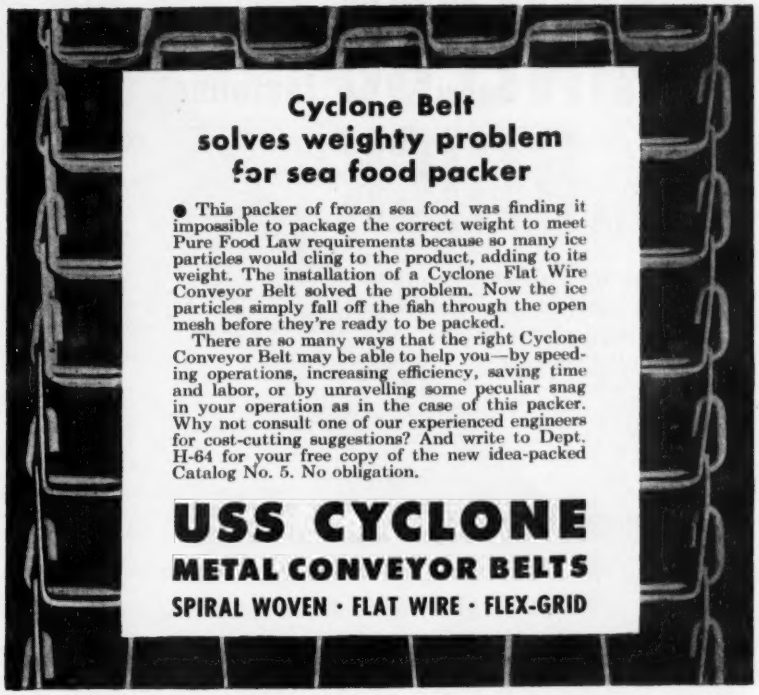
NFI Topics: Fish Sticks Tuna, and Reefer Ships

Highlights of recent talks and panel discussions at the National Fisheries Institute recent meeting in Cleveland concerned fish sticks, tuna, and ships equipped for deep freezing.

One of biggest boosts is introduction of fish sticks—firm, fresh slices of popular types of fish, frozen, breaded, and quick cooked in hot fat. Volume in '53 was over 7.5 million lb. And first three months of '54 exceeded 9 million.

Tuna also was revealed as one of fastest growing items. Annual catch last year was 10 million cases compared to 2 to 3 average prior to World War II. Recent signs indicate West Coast waters are not now a natural feeding ground. Pointers are to mid-Pacific.

Fish & Wildlife Service is seek-



Cyclone Belt solves weighty problem for sea food packer

● This packer of frozen sea food was finding it impossible to package the correct weight to meet Pure Food Law requirements because so many ice particles would cling to the product, adding to its weight. The installation of a Cyclone Flat Wire Conveyor Belt solved the problem. Now the ice particles simply fall off the fish through the open mesh before they're ready to be packed.

There are so many ways that the right Cyclone Conveyor Belt may be able to help you—by speeding operations, increasing efficiency, saving time and labor, or by unravelling some peculiar snag in your operation as in the case of this packer. Why not consult one of our experienced engineers for cost-cutting suggestions? And write to Dept. H-64 for your free copy of the new idea-packed Catalog No. 5. No obligation.

USS CYCLONE
METAL CONVEYOR BELTS
SPIRAL WOVEN · FLAT WIRE · FLEX-GRID

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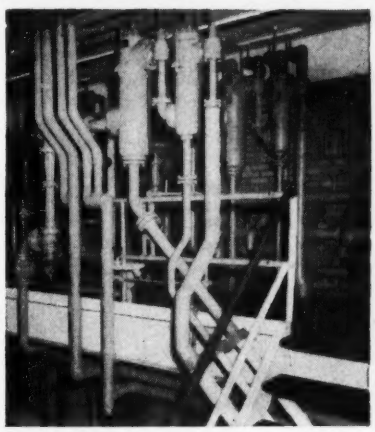
UNITED STATES STEEL



LET C-R EVACTORS help improve your health

This illustration shows two 4-stage Evactors in the plant of a leading manufacturer of vitamins and other pharmaceuticals. The same plant uses numerous other C-R Evactors of different types—as do the majority of manufacturers in this important field—for many different processes, including deodorizing, distilling, drying, refrigeration, etc. They are as simple as the valves that turn them on, yet maintain absolute pressures down to a small fraction of 1 m.m. absolute where steady, dependable vacuum is extremely important.

This steady, dependable vacuum is contributing to the improved health of our population by helping to supply purer and more potent vitamins, antibiotics and other pharmaceutical products. C-R also supplies Jet Mixers, Jet Heaters, Jet Absorbers, Jet Scrubbers, Jet Pumps, Jet Condensers and Barometric Condensers.

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Croll-Reynolds CO., INC.
Main Office: 751 Central Avenue, Westfield, N. J.
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CHILLVACTORS • STEAM JET EVACTORS • CONDENSING EQUIPMENT

For more information, use coupon on page 181.

STAINLESS fastener in STOCK

All types and sizes of screws (Phillips, slotted, hex head, socket), bolts, nuts, washers, rivets, keys and pins

- Over 9000 items in stock means *immediate delivery* from one source
- New Garden City plant now operating at *top speed and quality*
- Unsurpassed facilities for quantity fabrication of *specials*
- A staff of *seasoned* engineers always available for consultation
- *Pioneers* in the manufacture of stainless steel fasteners

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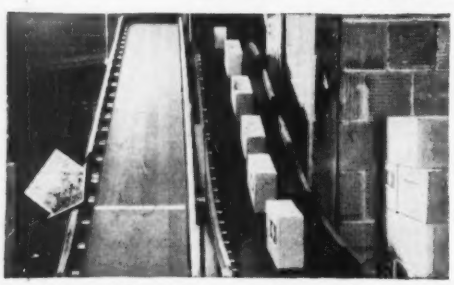
ALLMETAL

SCREW PRODUCTS COMPANY, INC.

GARDEN CITY NEW YORK

ALLIGATOR

CONVEYOR BELT LACING



Every Tooth A Vise

in Long Continuous Lengths Made of Stainless or Monel

★ Excellent for Package Conveyors, Portable Loaders, etc.
★ In canneries where corrosion or rust is a problem specify Alligator made of Stainless or Monel.
★ For magnetic separators or anti-sparking specify Alligator made of Everdur.
★ Separable and smooth on both sides.
★ 12 sizes. For belts from 1/16" to 5/8" thick—and *any width.*

Order from Your Supply House. Ask for Bulletin A-60

FLEXIBLE STEEL LACING CO., 4646 Lexington St., Chicago 44, Ill.

JUST A HAMMER TO APPLY IT

ing a method of catching fish in much greater volume over a shorter period. It also is trying to attract more Pacific fishers to the New England area, where tests show big supplies of so-called blue-fin tuna, weighing about 25 to 50 lb.

F&WS now is pushing deep-freeze equipment on the vessels. Whole fish thus are frozen at catch, processed later on shore. Advantages: Full boats returning with quality product, smoothing out processing with accompanying economies.

New Pack-Testing Leeway

A change in regulations has broadened scope of the temporary permits for processors market-testing new packs that vary from official standards.

Former wording on the permits, issued by the Secretary of Health, Welfare & Education, allowed only trial of new ingredients in standardized foods. As amended, there may be omission of a required ingredient or other changes in methods of production if such might improve the food and be advantageous to consumers.

FDA states this should give manufacturers greater leeway in carrying out necessary experimental work prior to making formal proposals concerning standards of identify. The revision was advanced by the Food Standards Committee, Food & Nutrition Board of the National Research Council, and it was supported by canners.

World Food Shorts

Aluminum cans now are being used commercially by Norwegian fish canneries. They're made by A/S Nordisk Aluminiumindustrie, Oslo.

Canned ham from Denmark to U. S. ran over $14 million in value in '53, as against $7 million in '52, $4 million in '51.

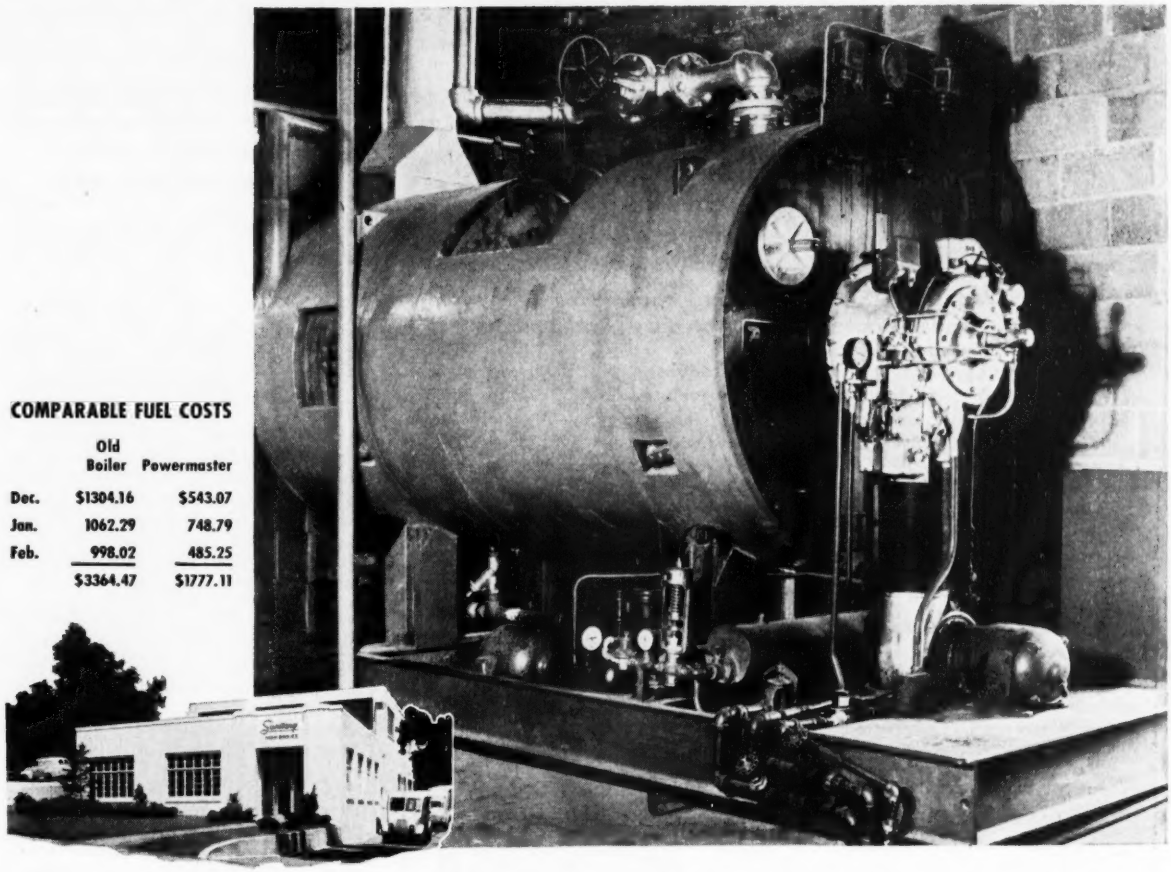
New sugar plant designed to cover some 90% of the country's consumption has begun operation at Guabira, near Santa Cruz, Bolivia.

First brewery in Jordan now will be built, following approval by Economy Ministry.

Traveling workshop is operated in Queensland, Australia, to supply technical and repair services to widely-scattered sugar plants.

Tomato paste process being initiated in Naples, Italy—the Cagnoni method—uses high-vac, low-temp technique of concentrating. Density of concentrate is automatically controlled by device that regulates flow of juice to evaporator.—*McGraw-Hill World News.*

in FOOD PROCESSING PLANTS



COMPARABLE FUEL COSTS

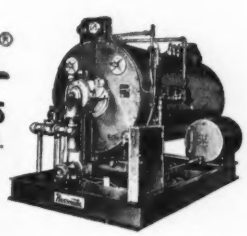
	Old Boiler	Powermaster
Dec.	$1304.16	$543.07
Jan.	1062.29	748.79
Feb.	998.02	485.25
	$3364.47	$1777.11

Powermaster® Operating Efficiency Pays Off

For example: An Iowa dairy cut fuel costs over 40% by replacing its original boiler with a modern oil-fired *Powermaster* a couple of years ago. And it is supplying steam for processing 150% greater volume of dairy products as well as for heating! The new boiler enabled the dairy to change to heavy oil for greater fuel economy.

Have you taken a close look at your steam costs lately? Remember, the big pay-off on a boiler is its operating efficiency . . . and that's where *Powermaster* excells, as many other dairies along with bakeries, bottlers, canners, packing houses, and other food processing plants have discovered since installing *Powermasters.* But installation, space-saving compactness, fast steaming, hospital-clean operation, maintenance-saving accessibility, and fully automatic operating and safety controls are other time-saving and cost-reducing advantages *Powermaster* provides. When you're in the market for a boiler, remember—Steam costs go down where *Powermasters* go in. Better send for latest descriptive bulletin today.

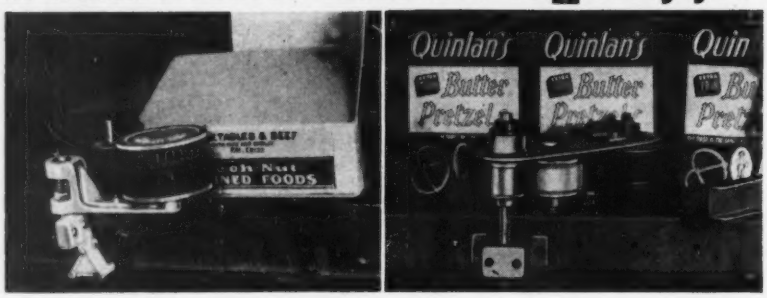
O·S *Powermaster*®
PACKAGED AUTOMATIC BOILERS
In sizes to 500 HP; pressures to 250 psi.



ORR & SEMBOWER, INC. • Established 1885 • **Morgantown Road, Reading, Penna.**

For more information, use coupon on page 181.

Low-cost marking attachment pays for itself in weeks...saves thousands of $ every year



ROLACODER Marking Machine imprints code-dates, lot numbers, brands, varieties automatically on cases and cartons

Eliminate manual marking of cases and cartons in your plant and save thousands of dollars in labor costs. Attach an inexpensive ROLACODER machine to case-sealer, conveyor or cartoner and let it do the marking job automatically. Compact, precision-made ROLACODER is friction-operated, self-inking—makes a single accurately located imprint on each carton to register with other copy. Uses quick-change rubber type or dies; holds 8-hour ink supply. Different models available for imprinting top, ends, sides of small or large cartons, cases, other packages.

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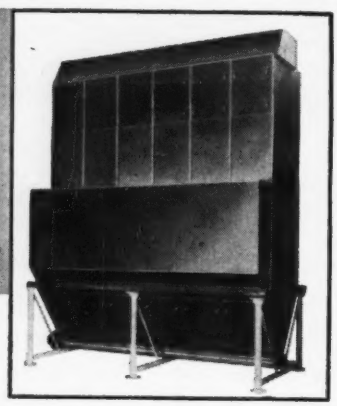
ADOLPH GOTTSCHO, INC.

50 Years of Leadership

Hillside 5, N. J.

In Canada: **RICHARDSON AGENCIES LTD., Toronto & Montreal**

ALL ALUMINUM CONSTRUCTION...



Simplified Modern Design

For efficient dust control, let us design your exhaust system incorporating the all-aluminum Simon Suction Filter Dust Collector!

A truly modern dust collector . . . it assures high air to cloth ratios . . . long filter cloth life . . . ease of cleaning and minimum maintenance. Each filter sleeve group is automatically cleaned, maintaining UNIFORM AIR FLOW at all times.

A Simon Suction Type Filter Costs No More Than A Pressure Type Unit.

The trademark "ENTOLETER" is your guarantee of complete satisfaction.

ENTOLETER DIVISION

The Safety Car Heating and Lighting Company, Inc.

P.O. BOX 904—NEW HAVEN 4, CONN.

Briefly . . .

• 5¢ CANDY BAR can be saved from suffering fate of the good 5¢ cigar through application of modern plant automation. So says William J. Scarlett, of Minneapolis-Honeywell, who illustrates possibilities by citing new automatic bar-forming lines combining electronic and mechanical equipment in firming, cooling, coating, and cutting.

• **WATERMELON-JUICE BANK is maintained at Atlanta, Tex., for free supply of the remedial fluid for use by patients suffering kidney ailments. The juice is kept in deep-freeze.**

• WINE to a total of 140,680,000 gal. was distributed in '53 in the U. S.—highest figure of any calendar year—reports Wine Institute. Rise over the year 1952 was calculated as 2.29%.

• **DAIRY-STUDY SCHOLARSHIPS to be awarded by Dairy Industry Supply Assn. to leading college teams in products-judging contest at Exposition at Atlantic City, Oct. 25-30, have been raised from three to four. Grants now are: First, $1,380; second, $1,280; third, $1,180; and fourth, $900.**

• BORDEN RESEARCH AWARD for Nutrition has gone to joint winners—Dr. Agnes F. Morgan, U. of California home economics department chairman, and Dr. A. H. Smith, Wayne U. School of Medicine. Cited was their independent work on values of milk proteins.

• **"COLD STERILIZATION" advances are aimed for by Applied Radiation Corp., Walnut Creek, Calif., with a new-type electron linear accelerator termed "revolutionary." New power at less expense is seen by company, which believes outlay will be about $100,000. Weight of unit is put at 2,000 lb., with space required only 4x4x9 ft.**

• SUGAR EXPANSION program earmarking $3 million for added facilities is announced by Imperial Sugar Co., Texas' only cane refinery. This new 6-yr. outlay follows the $4 million plan underway since '47. Latter raised plant capacity to 2.5 million pounds daily.

• **42ND BAKERY of General Baking Co., maker of Bond Bread, has been opened at Spartanburg, S. C. Sixty trucks will be operated from new $1,700,000, 68,000-sq. ft. facility.**

• RICE EXPORTS are running some 20 million pounds ahead of the last marketing year, states USDA. Free movement after October, unencumbered by the old price ceilings and allocations, was cited as one reason.

• **"FOOD FADDISTS and nutrition quacks are doing great damage to the public by misleading propaganda. Their efforts cause economic loss in wasted expenditures on food fads reaching about $500,000,000 per year. What is more serious is the confusion they cause in preventing the**

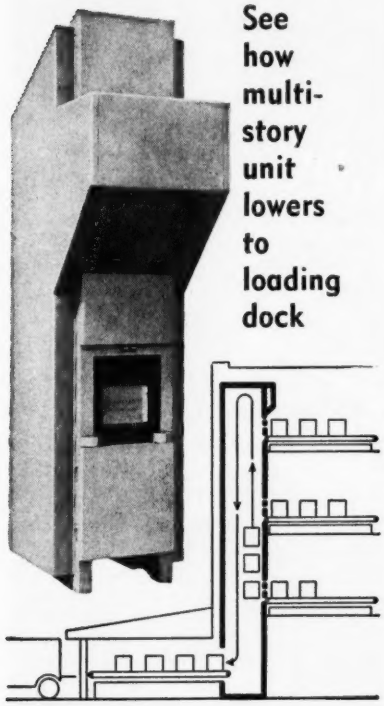
A BETTER WAY

TO HANDLE CARTONS BOXES, CRATES, ETC.

THE

ROBO-LIFT

TRAY ELEVATING OR LOWERING CONVEYOR



See how multi-story unit lowers to loading dock

Elevates (or lowers) and conveys cartons, crates, boxes, cases, etc.

Vertical-to-horizontal or horizontal-to-vertical.

Manual or automatic in-feed and discharge.

Pick-up or discharge at more than one level.

Handles various sizes.

Safe, positive, gentle.

Designed and built by the manufacturers of the ROBO-LIFT BUCKET ELEVATING CONVEYOR.

Write for descriptive literature

Counsel
MACHINE COMPANY, INC.
8 HATHAWAY STREET WALLINGTON, N. J.

public from learning and having confidence in sound nutrition practices."—Dr. Charles G. King, director of the Nutrition Foundation, Inc.

USDA Standards

Recent actions by USDA's Agricultural Marketing Service include the following:

Wheat, revisions in reference to smut dockage, effective Aug. 2, p. 2339, Apr. 22 *Federal Register*.

Barley, revisions of malting barley definitions, effective Aug. 2, p. 2339, Apr. 22 *federal register*.

Frozen mixed vegetables, revised, effective May 23, p. 2340, Apr. 22 *federal register*.

Poultry, revisions of inspection location provisions, p. 2343, Apr. 22 *federal register*.

Peeled potatoes, revised, effective June 7, p. 2647, May 8 *federal register*.

Cucumber pickles, corrections in revisions on p. 1695, Mar. 30 *federal register*, p. 2650, May 8 *federal register*.

Dry buttermilk, proposed, p. 2675, May 8, *federal register*.

Cheddar cheese, proposed amendment to allow use of aluminum foil wrapping, p. 2676, May 8 *federal register*.

Schedule of Events

June

12–15—New England Bakers Assn.; Poland Spring, Me.
17–18—Bakery Equipment Manufacturers Assn.; Cavalier Hotel, Virginia Beach, Va.
20–25—Nuclear Engineering Congress, University of Michigan, Ann Arbor.
22–24—American Dairy Science Assn., annual meeting; Pennsylvania State University, State College, Pa.
27–J1—Institute of Food Technologists, annual meeting and exhibit; Hotel Biltmore, Los Angeles.

July

13–15—Western Plant Maintenance Show; Pan Pacific Auditorium, Los Angeles.

August

17–19—Western Packaging & Materials Handling Exposition; Civic Auditorium, San Francisco.
29–S1—International Apple Assn.; Yakima, Wash.

September

12–15—Confectionery Caravan Show; Palmer House, Chicago.
17–19—National Poultry, Butter & Egg Assn.; Chicago.
19–22—National Frozen Food Locker Institute; Hotel Jefferson, St. Louis.
26–28—Southern Bakers Assn. Production Conference; Hotel Biltmore, Atlanta, Ga.
26–30—Master Brewers Assn. of America, annual convention; Waldorf-Astoria Hotel, New York City.
30–O2—Southwestern Frozen Food Assn.; New Orleans, La.

Get more production from your present processing equipment. Increase capacity by eliminating space-wasting foam with Dow Corning silicone defoamers. Here are some typical examples:

- ✔ **standard molasses processing load increased from 18 to 24 tons!**
- ✔ **yield on textile vat dyes doubled!**
- ✔ **in processing food, vacuum concentration capacity increased 60%!**
- ✔ **proposed $2,000,000 expansion of processing plant made unnecessary by efficient foam control!**

Dow Corning Antifoam A Compound and Antifoam AF Emulsion are the most versatile and economical defoamers on the market. Effective at remarkably low concentrations, they pay for themselves time and again in more complete use of process equipment and shorter processing time, and in the elimination of waste and fire hazards. Both defoamers are tasteless, odorless and physiologically harmless.

For more efficient foam control . . .

Use DOW CORNING ANTIFOAM A or DOW CORNING ANTIFOAM AF EMULSION

send for FREE SAMPLE

Dow Corning Corporation, Dept. BF-18
Midland, Michigan
Please send me data and a free sample of
☐ Dow Corning Antifoam A
or ☐ Dow Corning Antifoam AF Emulsion

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COMPANY_____
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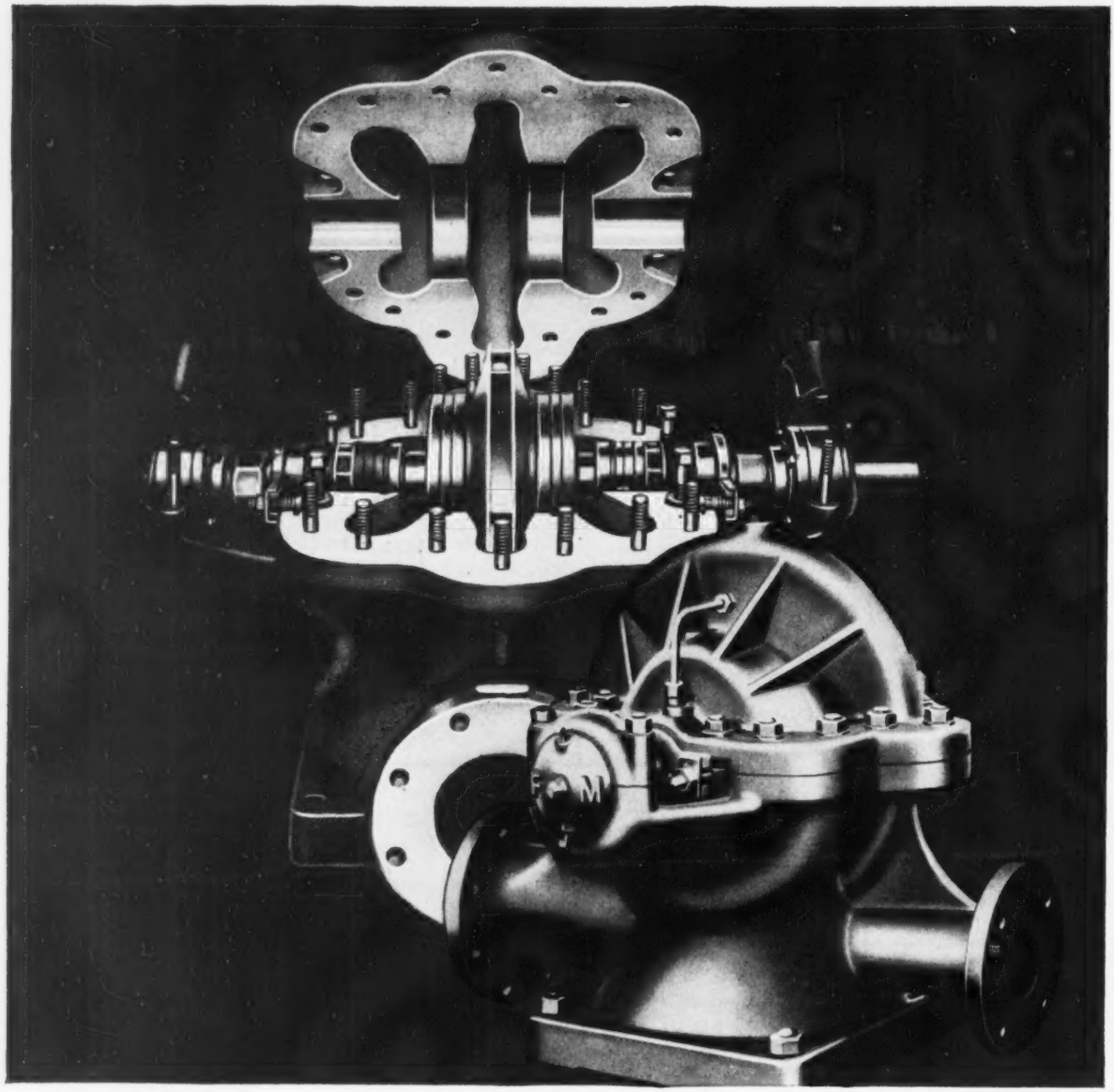

out of the mouth of a pump...

Suppose a pump could "spill its works" . . . tell you how it was made . . . speak of the design, material, workmanship that went into its being . . . then you could know . . . and buy with confidence.

Because after all, pumps do look very much alike. How, then, to tell which make is best for you. *Reputation* is one way, *performance* another.

And, on both counts, Fairbanks-Morse pumps stand out. Don't take our word for it. Check with Fairbanks-Morse users. We'll stand by their verdict. For Fairbanks-Morse has only one standard . . . *quality* . . . the quality that means dependability, service, low maintenance, all those important points that you want in the pumps you buy.

To get these advantages in your pumps, rely on the world's largest manufacturer of a complete pump line. See your nearest Fairbanks-Morse Branch, pump dealer, or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

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Showplace Plant

—*Continued from page 51*

Packed on the second table are sheep-casing franks and pork sausages in 10-lb. cartons. Meat loaves are stuffed into transparent casings on the third table. Empty cages are railed to the washer on their way back to the sausage kitchen.

All boxed products like franks and sausages are loaded on pallets and transported by lift truck to the sausage-assembling section in the centralized-packing room. Portable trucks take meat loaves and hanging items to the same section.

Beef, veal, and lamb are railed directly from refrigerated railroad cars and trucks into the centralized cooler room to be cut into primal and boneless cuts. Back on overhead rails, cut meats then go to the shipping cooler.

Inherent in the function of this pace-setting branch house is the centralized packing system carried out in the big 33-deg. cooler. Orders are put up in six sections, each operated by a department head and clerks. Assembled items move to the shipping dock via two overhead rails or roller conveyors. The latter are telescopic to extend on shipping floor.

Task of assembling orders at each section has been simplified through the installation of company-designed, space-saving pallet racks (5x5x18 ft.) made of 2-in. pipes and angle irons. They permit double-stacking of pallet-loads—on floor and on top of racks.

In one section, butter, cheese, eggs, and poultry are trucked to proper places in the shipping room. Iced crates (70 lb.) of dressed poultry are kept in 33-deg. wet storage, ready for order assembling. Pork, bacon, hams, and other provision items, are put up in boxes in another section, to be roller-conveyed to shipping.

Assembled in still another section are fresh and smoked sausage items as well as canned provisions like hams, spiced luncheon meats, etc. These weighed-and-boxed orders are also roller-conveyed to shipping.

The other three sections are devoted to beef cutting, dressed beef, and lamb and veal cutting. Here, meats are cut, weighed, wrapped, and moved on rails to shipping.

Five lengths of side-by-side rails furnish meats to beef cutting, where such hotel and restaurant cuts as legs, ribs, loins, and full rounds are prepared. Meat trimmings are ground into hamburger meat or machine-made into patties. Briskets are packed in barrels to be made into corned beef.

Seven rail lengths supply veal and lamb to the fifth section for cutting.

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THE RIGHT CONVEYOR BELT FOR YOUR PRODUCTS?

It's easy with
TON-TEX BELTING

The *right* belting for conveying your products speeds production and lasts longer, cutting your costs. Ton-Tex will do that for you. Plies of tightly woven cotton duck are impregnated with compounds under pressure to produce belts that will meet your specific needs. Easy to clean for sanitary handling of unpackaged foods. Let us help you select the *right* belt for your conveyor jobs.

Moisture, acids, oils, heat trouble you?

For 25 years Ton-Tex has furnished food processors and canners with conveyor belts specially treated to resist these conditions. They impart no odors or taste to the products. Can be cleaned like new without injury to the belting. From experience, processors *know* Ton-Tex lasts longer.

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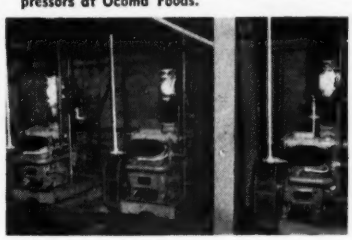
FRICK

***Equipment* Freezes 18,000 *Chickens* Per Day**

Above: View of the packaging end of the Ocoma production line.
Below: Three of the Frick refrigerating compressors at Ocoma Foods.



At the Poultry Processing Plant of the Ocoma Foods Company in Berryville, Arkansas. This recent addition to the rapidly expanding Ocoma Foods Company employs over 275 people, and incorporates all of the latest developments in production-line poultry processing.

Six Frick compressors supply the refrigeration necessary for the chilling, quick-freezing and cold storage phases of the process.

This is but one of hundreds of different applications of Frick refrigeration and air conditioning in the food industries.

When writing for literature, please describe the cooling work you have in mind.

DEPENDABLE REFRIGERATION SINCE 1883
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

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Is Contamination Costing you Money?

Airborne bacteria and mold, invisible to the human eye, swoop down on food exposed for even a fraction of a second. Filtering through sanitary precautions, these food plant demons contaminate products . . . impairing quality and flavor. They also cost you money through returns, scrapping and lost customers. Yet many processors have found a simple, complete answer in Westinghouse Sterilamps.

WESTINGHOUSE STERILAMPS are being used successfully in many industries where contamination due to airborne bacteria or mold WAS a problem. In just a few minutes, you can find out for yourself whether Westinghouse Sterilamps fit your specific needs.

WESTINGHOUSE LAMP DIVISION
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Without cost or obligation, I would like to know more about how Westinghouse Sterilamps help control contamination.

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weighing, and wrapping. Thirteen rail lengths carry hinds and full quarters to the beef-dressing section. These are broken down into ribs, chucks, plates, briskets, rounds, rumps, and loins for shipping.

Lard, shortening, margarine, canned meats, and similar items, are trucked from dry storage to be lined up for delivery trucks. Similarly handled are frosted meats from freezer storage.

Most of the order assembling is carried out before loading to get trucks off to a quick morning start.

To safeguard product quality, orders are lined up for delivery trucks in the shipping room, which is refrigerated with blower units. Before trucks are loaded, they are pre-chilled to about 38 deg., with truck compressor motors being plugged into a 110v. a.c. circuit. Loaded trucks are again refrigerated in the same manner.

End (Resume reading on page 52)

Profit Sharing

—Continued from page 54

Recent sales gains have been consistent, he pointed out. But increases were almost equally consistent before profit sharing. Production costs have been lowered in spite of higher wages and higher costs of supplies and utilities.

But it's a difficult matter to locate exactly where the savings have been made. Everyone does a little bit more now than before, he believes. Also, everyone is more careful about waste and costs than before profit sharing. Therefore, many small savings are realized which, when added up, create a bigger profit.

In addition to the going union wage and profit sharing, Sunrise provides usual fringe benefits, including sick benefits and a pension and retirement plan for both union and non-union employees. Here, the company annually contributes 5% of wages and salaries.

Vacations with pay are provided—three weeks after five years of service with the company.

All employees are encouraged to continue their education. Courses are provided by the company in local high schools (night school), also by correspondence and college extension. The company pays half.

Moreover, the company suggestion system has been fertile, producing many cost saving ideas. Though there is the profit-sharing incentive to encourage idea development, nevertheless constant management drive, and merchandising of the need for ideas, is necessary to maintain an idea flow.

End (Resume reading on page 55)

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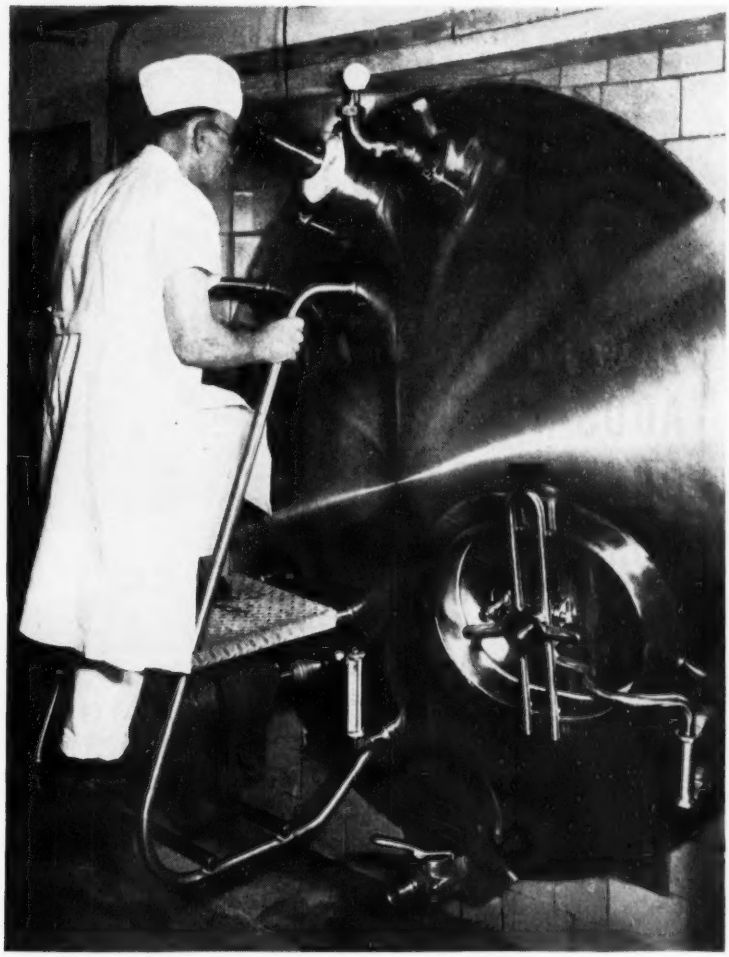

You can store 2000 gallons of milk in this stainless steel tank. What's more, the milk can stay there *without harmful bacteria count increasing.*

As a result, this cheese manufacturer has better control of his product quality. He can also arrange his work schedules so that they're uniform, because he knows the milk is safe in ENDURO Stainless Steel until it's processed.

One big reason is ENDURO'S smooth surface that offers little foothold for contaminants. It doesn't contaminate metallically. Nor does it add anything to food products. Or take anything away. And it resists the action of food acids.

Cleaning is simple and easy. All it usually takes is a quick wash and a rinse to restore ENDURO'S satiny luster. It means less down time, more production time, and a product you're proud to label.

Safeguard the purity and quality of your food products by using equipment made of ENDURO Stainless Steel. Talk it over with your equipment supplier. Republic metallurgists will be glad to help you use this thrifty metal, profitably.

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Export Department: Chrysler Building, New York 17, New York

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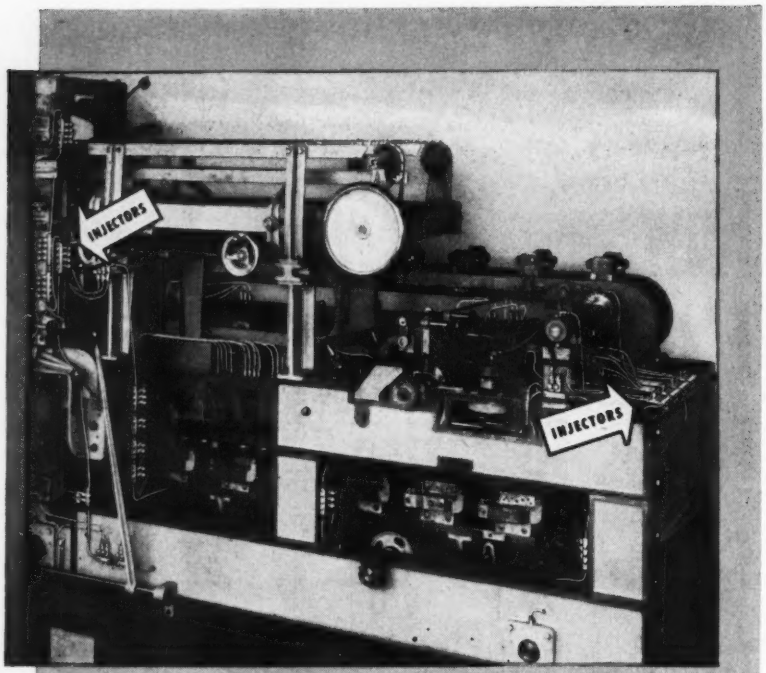
"Lincoln CENTRALIZED LUBRICATION SYSTEM ADDS HOURS OF PRODUCTION TO OUR MACHINES"

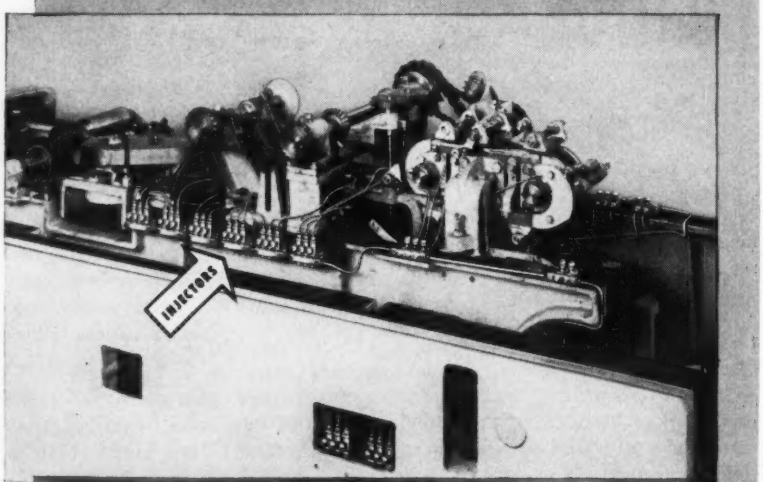
reports Battle Creek Bread Wrapping Machine Co., Battle Creek, Michigan



More than 500 bearings are lubricated simultaneously and automatically by the time clock controlled Lincoln Systems installed on these Battle Creek machines.

"By using Lincoln's Centralized Lubrication on our machines we have eliminated shutdowns that were previously necessary to lubricate or replace bearings worn from lack of lubrication. This time saved means extra productive capacity each day of operation. On our high-speed Carton-Making, Filling and Top-Sealing machines we find Lincoln Systems to be reliable and flexible enough to meet many varying operating conditions."

F. M. Willbrandt
Chief Engineer
Packaging Division



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LUBRICATING EQUIPMENT • • •

In all kinds of plants, throughout the Food Processing Industry, Lincoln Centralized Lubrication Systems are helping to increase output, reduce down-time, reduce lubrication costs and eliminate spoilage of products in process from presence of excess grease. A qualified Lincoln Lubrication Equipment Specialist will be glad to study your lubricant application needs, and make a recommendation.

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Edible Shortening Composition Containing Inactivated Dihydroxyphospholipid—*E. F. Glabe to Food Technology Inc., Chicago. No. 2,666,705. Jan. 19, 1954.*

Edible Fat Containing Polyethylene Glycol Esters—*E. I. Valko, Mountain Lakes, N. J. to E. F. Drew & Co., Inc., New York. No. 2,666,706. Jan. 19, 1954.*

Food Preserving Coating Including Pure Virgin Wax, Vegetable Oil, Creosole, and Oil of Chicory—*M. Rizzardi, Trieste, Italy. No. 2,668,121. Feb. 2, 1954.*

Frozen Concentrated Milk Product Resistant to Age Thickening Through Blending Hydrolyzed Lactose-Containing Milk Solids and Freezing—*E. G. Stimpson, Sayville to National Dairy Research Laboratories, Inc., Oakdale, N. Y. No. 2,668,765. Feb. 9, 1954.*

Pie and Pie Crust Blank With Hexagonal Top Shape Tapered to Circular Bottom Crust—*J. F. Lowe, Wayne Township, Du Page County, Ill. No. 2,668,767. Feb. 9, 1954.*

Stable Meat-Curing-Salt-Composition of Sodium Chloride With Heart-Like Center Crystals of Alkali Metal Salt Plus Anti-Caking and Sequestering Agents—*Lloyd A. Hall to Griffith Laboratories, Inc., Chicago. No. 2,668,771. Feb. 9, 1954.*

Food Product Flavoring Composition Employing Colloidal Cheese Carrier—*F. H. Stark, Waueatosa, Wis. No. 2,670,293. Feb. 23, 1954.*

PROCESSES

Treating Citrus Fruit to Prevent Stem-End Decay and Mold by Wetting in Composition Containing Oxime in Aqueous Alkaline Solution—*P. A. Wood to Dow Chemical Co., Midland, Mich. Nos. 2,668,115-16, Feb. 2, 1954.*

Stabilizing Edible Fats and Oils by Adding 4-Alkoxyphenol With At Least One Hydrogen Ring Substituted by Alkythioalkyl Group—*J. A. Chenicek, Bensenville to Universal Oil Products Co., Chicago. No. 2,668,768. Feb. 9, 1954.*

Gelling Composition Comprising Mixture of Gelose of Irish Moss Type, Agar, Neutral High Polymer, and Cation Containing Salt—*G. L. Baker, Newark, Del. to Seaplant Chemical Corp., New Bedford, Mass. No. 2,669,519. Feb. 16, 1954.*

Preserving Color, Flavor and Appearance of Fresh and Processed Shellfish and Crustaceans by Treating With Soluble Ethylenediamine Tetracetic Acid—*C. R. Fellers, Amherst, Mass. to Blue Channel Corp., Port Royal, S. C. No. 2,669,520. Feb. 16, 1954.*

Retarding Protein Degradation in Heat Processed Farinaceous Foods by Adding Antiproteolytic Legume Extract Prior to Heating—*D. Melnick, West Englewood, N. J. No. 2,670,291. Feb. 23, 1954.*

Preserving the Fresh Flavor of Butterfat by Separating From Bulk of Non-Fat Components and Increasing Sugar Content Prior to Heating Sugar-Fat Mixture—*G. D. Turnbow, Piedmont to International Dairy Engineering Co., Oakland, Calif. No. 2,673,155 March 23, 1954.*

Retarding Fungus Growth on Citrus Fruit by Treating With Thionocarbazate—*D. J. Beaver, Richmond Heights, Mo. to Monsanto Chemical Corp., St. Louis. No. 2,673,159. March 23, 1954.*

Preserving Shell Eggs by Flash Dry Heating at High Temperature to Destroy Surface Microflora, Cooling—*R. E. Feeney, Berkeley, A. H. Brown, El Cerrito, and L. R. MacDonnell, Richmond, Calif. to USA. No. 2,673,160. March 23, 1954.*

Pickling Tripe in Aqueous Acetic Acid Bath With Hydrogen Peroxide, Washing, Immersing in Conventional Pickle—*L. S. Paddock to Swift & Co., Chicago, No. 2,673,804. March 30, 1954.*

EQUIPMENT

Milk Fat Blending Apparatus Comprising Strainer and Sloped Weigh Tank Equipped With Bender Plate to Funnel Milk in Heavy Stream to Tank—*V. Schwarzkopf, La Grange, Ill. to Lathrop-Paulson Co., Chicago. No. 2,662,751. Dec. 15, 1953.*

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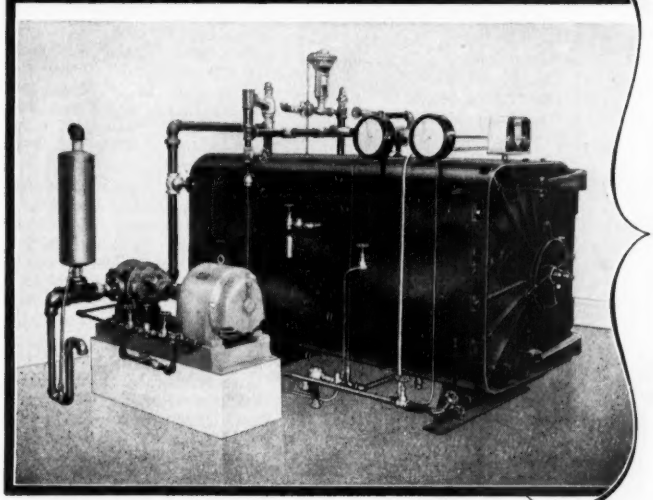

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In-Vat Cheese Curd Cutter Comprising Two Frames Rotatable About Central Axis Providing Scissor-Like Action—*B. T. Hensgen to Swift & Co., Chicago.* No. 2,663,081. Dec. 22, 1953.

Fish Scaler With Rotary Feeder and Lengthwise Stripping Roll—*J. N. Brophy to Ruth C. Brophy, Wakefield, Mass.* No. 2,664,591. Jan. 5, 1954.

Coconut Husker With Longitudinal Knives Urged Towards and Away From Each Other to Engage Husks—*A. H. Beeken, Tacoma, Wash.* No. 2,666,465. Jan. 19, 1954.

Leafy Vegetable Washer and Dryer With Perforated Conveying Belt, Washing Section, Suction Nozzles for Removing Moisture on Oscillating Section—*R. B. Crosset to Crosset Co., Cincinnati.* No. 2,666,711. Jan. 19, 1954.

Poultry Shackle With Teeter Bar and Attached Head Hook, Whole Supporting Bird Beneath Head and by Feet—*L. R. Lentz and D. B. Van Dolah to Swift & Co., Chicago.* No. 2,667,660. Feb. 2, 1954.

Poultry Scalding by Subjecting Body to Heated Fluid and Legs to Fluid of Higher Temperature—*H. J. Long to Swift & Co., Chicago.* No. 2,667,661. Feb. 2, 1954.

Grain Scourer With Perforated Drum, Beater Rotor, Tangental Inlet, Pivoted Baffles—*F. Tanner, St. Gallen to Gebruder Buhler, Uzwil, Switzerland.* No. 2,667,905. Feb. 2, 1954.

Single Whole Fruit Feeder Employing Cavatied Feed Wheel Fed by Telescoping, Arcuate Mouth Section—*T. J. Reese, Elkhart, Ind., and N. B. Wood, Lakeland, Fla. to Food Machinery & Chemical Corp., San Jose, Calif.* No. 2,667,961. Feb. 2, 1954.

Syrup Mixer With Parallel Supply Tanks, Each Equipped With Elongated Swinging Bucket Moved by Rotary Power to Feed Main Tank at Dictates of Level Control—*R. J. Unser, Faribault, Minn.* No. 2,667,989. Feb. 2, 1954.

Baking Pan Cover Remover Employing Plurality of Engaging Pick-ups to Dislodge Covers—*H. E. Temple, San Gabriel, Calif. to Read Standard Corp.* No. 2,668,002. Feb. 2, 1954.

System to Control Gains in Weight of Article During Processing Employing Electric Load Cell and Servo Proportioning System—*W. E. Moss, Brookfield, and O. Garapolo to Wilson and Co., Chicago.* No. 2,668,493. Feb. 9, 1954.

Sorter for Separating Long- From Short-Stemmed Cherries Employing Recessed Fruit Carriers on Belt Beneath Upper Stem-Gripping Drum—*P. Wormser and D. Madrid to S & W Fine Foods, Inc., San Francisco.* No. 2,668,619. Feb. 9, 1954.

Rotary Disk Slicer for Rows of Buns Utilizing Cutter Frame Over Traveling Conveyor—*A. S. Schmidt, Harrisburg, Pa.* No. 2,669,269. Feb. 16, 1954.

Bread Reslicer Comprising Rotatable Cutter and Aligned Movable Hopper—*I. B. Rosenberg, Port Chester, N. Y. ½ to P. D. Arnold, Rye, N. Y.* No. 2,669,270. Feb. 16, 1954.

Pullman-Bread Pan-Lidding Machine Employing Lever Locating Means for Releasing and Positioning Lids—*E. Van Poolen, Cicero, and L. G. Vogel, Evanston, Ill. to W. E. Long Co., Chicago.* No. 2,669,377. Feb. 16, 1954.

Sausage Molding Device Arranged to Fit Over End of Stuffing Horn—*R. M. Hovland, Colfax, Wis. to Swift & Co., Chicago.* No. 2,669,749. Feb. 16, 1954.

Variegated Ice Cream Maker Comprising Aligned Vertical Chambers With Inlets for Flavor and Basic Substance Under Pressure Employing Pattern-Making Dispersing Disk—*N. I. Peyton, Baltimore, Md. to Joe Lowe Corp., New York.* No. 2,669,946. Feb. 23, 1954.

Doughnut Former Employing Sliding Spaced Disks in Hopper Spout—*M. Cottingham, Shreveport, La. to W. R. Stephens Investment Co., Inc., Little Rock, Ark.* No. 2,669,949. Feb. 23, 1954.

PACKAGING

Package for Brewing Essences Consisting of Filter-Like Envelope Coated With Water-Repellent Lacquer—*L. Hirschhorn (by B. Hirschhorn, R. H. Mann, and M. Hirschhorn to National Tea Packing Co., New York City.* No. 2,671,026. March 2, 1954.

Conditioning Cans Containing Foaming Products by Passing Into Steam Fog to Burst Air Bubbles, Then Laying Agitating Blanket of Steam Over Product to Induce Foaming—*E. E. Jeremiah, Modesto, to Pacific Can Co., San Francisco, Calif.* No. 2,672,420. March 16, 1954.

Filling Machine With Electrically Operated Measuring Cylinder—*B. S. Harrington to Armour and Co., Chicago.* No. 2,673,012. March 23, 1954.

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

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This is typical of the dependable service that's built into every Lunkenheimer Valve. Take advantage of Lunkenheimer leadership in design, materials, and workmanship. Specify and use Lunkenheimer Valves — service-engineered for *your* applications. The Lunkenheimer Company, Box 360Q, Cincinnati 14, Ohio

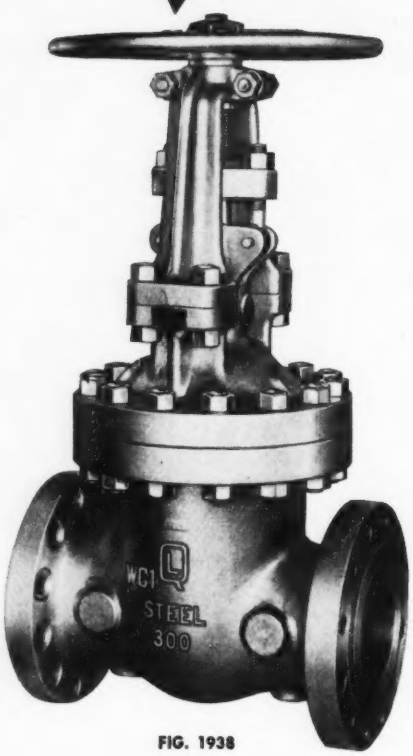

FIG. 1938

The cost of a Lunkenheimer Valve gets smaller and smaller and smaller with each passing year of dependable service.

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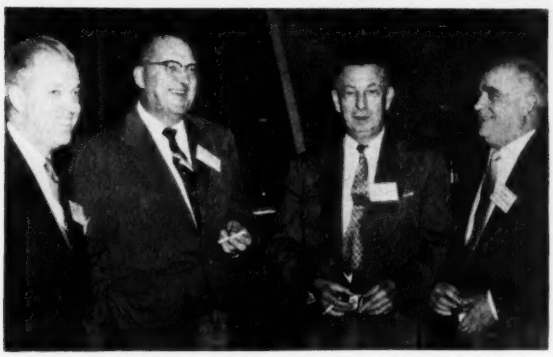


American Dry Milk Institute, Inc., choose officers at its 29th annual convention in Chicago (left to right): M. R. Debaets (Bowman Dairy Co., Chicago), secretary-treasurer; R. M. Hadrath (Maple Island, Inc., Stillwater, Minn.), vice-chairman; Tom G. Stitts (Boston's H. P. Hood & Sons, chairman; and Dr. B. W. Fairbanks, who continues as executive director.

Industry

All-American Nut Co. of Downey, Calif., has begun construction of a new $150,000 plant in Lewisville, Tex., to be completed in August.

American Home Foods, Inc. of New York City has bought Dennison's Foods, Oakland, Calif. processor of tomato products and other foods.

Ault Creamery Ltd., Winchester, Ont., has purchased the plant of Libby, McNeill & Libby Ltd. and is modernizing at estimated cost of $250,000.

Bowman Dairy Co. has added Gordon Adamson and Maurice R. Debaets to its board of directors.

Canada Dry Ginger Ale, Inc. has elected Wilbur M. Collins president of the Canadian subsidiary, Canada Dry, Ltd., and Canada Dry International, Inc., and Ralph O. Nims vice-president and general sales manager for U. S. operations.

Catelli Co., Ltd., Montreal, largest manufacturers of macaroni food products in the British Empire, is establishing a branch plant in St. Thomas, Ont.

Charlotte (N. C.) Pepsi-Cola Bottling Co. has announced plans for construction of $100,000 bottling plant at nearby Gastonia, N. C.

Consolidated Foods Corp. will build a new processing and distribution center in River Grove, Chicago suburb.

Dairy Queen of Jacksonville, Inc., Wilmington, N. C., has been organized with capital stock of $100,000 to deal in all forms of dairy products.

Dr. Pepper Co. has named Hugh Thompson new manager of all company-owned plants.

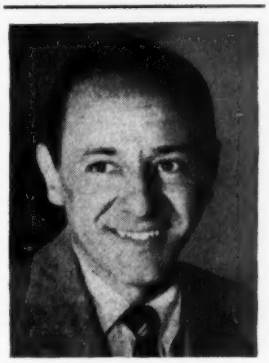
Farmers' Abattoir, St. Boniface, Man., suffered fire damage of $150,000.

Fox Royal Bakery, Inc., Wilmington, N. C., has obtained a charter to deal in bakery products under authorized capitalization of $300,000.

General Baking Co. has completed its $1,700,000 plant in Spartanburg, S. C.

General Foods Corp., White Plains, N. Y., has elected the following new directors: George Hampton, Wayne C. Marks, Ray M. Schmitz and Lester E. Waterbury.

General Mills, Inc., Minneapolis, has started construc-



Miguel Quirno-Lavalle, member of board of Liebmann Breweries, N. Y. City, is new president of California Brewing Co., new corporate name of San Francisco div. of former Acme Brewing Co., purchased by Liebmann.

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Peter A. Schamber has been appointed master brewer of Blatz Brewing Co., having been with the company since 1926.

tion on a $2 million package foods plant near Toronto.

Hathaway Bakeries, Inc., of Boston has elected S. Carl Crosby as president and John S. Slater as board chairman.

Holly Sugar Corp. has purchased a site in San Mateo, Calif., for construction of western headquarters building to cost $150,000.

Kraft Foods Ltd. has let the construction contract for its new plant in Mount Royal, Que., second in size only to the Chicago plant; and also elected the following vice-presidents: A. H. Mathieu, P. J. Katien, T. B. Cooper, and F. E. Wright.

Maple Leaf Milling Co., Ltd. has appointed J. Elder and G. M. MacLachlan as new vice-presidents.

Miller-Becker Co., bottlers of Hires Root Beer, Squirt and Cotton Club Quality Beverages, has begun construction of $1 million bottling works at Cayahoga Heights, Ohio.

Mini-Mas Provisions, Inc. has announced plans for a new $200,000 bakng plant at Smith Center, Kan.

John Morell & Co. has acquired the H. & M. Provision Co., Chicago.

N. Carolina Apple Growers Assn. has been formed by state's apple growers "to promote all phases of the apple industry".

Pepsi Cola Bottling Co. of Keen Mt., Va. Inc., has been capitalized at $100,000, with George Hunnicut, president.

Piel Bros. and Piel's, Inc., have appointed Robert G. Moberly and Edmund W. Velten as assistants to the president.

Pennsylvania Salt Mfg. Co. has created and named two new vice-presidents: Dr. William A. LaLande, Jr., and E. F. Beale.

Quinlan Pretzel Co., leading pretzel manufacturer, has acquired a new two-story building in Denver.

A. E. Staly Mfg. Co., corn and soybean processor, has elected two new directors: Roy L. Rollins and Robert J. Murphey.

Streitmann Biscuit Co. is completing its Macon Ga. plant, with floor space of 180,000 sq. ft.

Swift Canadian Ltd., Toronto, will shortly open its $4 million addition to the branch plant in Moncton, N. B.

Weber Brewing Co. of Waukesha, Wis., has purchased Van Merritt Beverage Co. of Burlington, Wis. for approximately $500,000.

Personnel

A. J. Albert, Jr., has joined the operations dept. of National Biscuit Co. and will be in Nabisco's new Chicago bakery in the production dept.

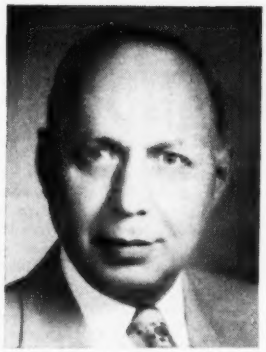
Frank M. Bauer, master brewer of Goebel Brewing Co., Detroit, has been elected company vice-president.

R. A. Bingham, Jr. is new manager of Swift & Co.'s ice cream plant in Charleston, S. C.

Leslie F. Burrows has been named director of Consolidated Bakeries of Canada Ltd.

C. C. Cadagan has been elected vice-president in charge of sales and production for Alexander & Baldwin's pineapple operations.

Dr. Harry E. Goresline, specialist on problems pertaining to chemistry and bacteriology of eggs and poultry, has been promoted to newly created post of associate director of research, Food Labs., Quartermaster Food and Container Institute for the Armed Forces.



E. G. Kasch, general personnel manager of Kraft Foods Co., is new vice-president of the firm.

James Dillon has been elected vice-president of National Starch Products Inc., New York City.

Arnold Ducklin, previously manager of ice cream dept., is now co-ordinator of Canadian ice cream operations for Borden Co. Ltd., Walkerville, Ont.

Fred T. Haley is new president of Brown & Haley, candy manufacturers at Tacoma, Wash.

Harold E. Lowe has been appointed executive vice-president of the western division of Blue Moon Foods, Inc.

Ray Murray has been named manager of the western region division of Ward Baking Co. with headquarters in Chicago.

Robert C. Rice has been appointed manager of the Schweppes Div. of Pepsi-Cola Co. of Canada, Ltd.

J. M. Thompson was named president of Orange Crush Co., Chicago.

Harold Willis, manager of Standard Bread Co., Ottawa, Ont., is new president of Ontario Bakers Assn.

O. W. Woods has been named president of Becker Pretzel Bakeries, Inc.

Associated Industries

American Machine & Foundry Co. has announced the following appointments: director, David S. Meiklejohn; executive vice-president, Rodney C. Gott; and divisional vice-president and general manager of manufacturing, T. R. Dreyer.

De Laval Separator Co., maker of milk and cream production machinery, has elected W. A. Neumann, Jr. as new executive president and treasurer.

First Machinery Corp. has now consolidated all departments under one roof in Brooklyn.

Food Machinery & Chemical Corp., San Jose, Calif., has acquired controlling interest in Morris & Martin, Ltd., manufacturers of machinery for pineapple canning industry and mechanical, irrigation and marine engineering services in Port Elizabeth, S. Africa.

National Can Corp's new directors are Andrew M. Toft and Mervin B. France.

Stein, Hall & Co. has announced the appointment of S. Crawford Bonow as manager of the Manufacturing Div., Paul Kaplan as manager of the Technical Div., and Albert R. Robbins as manager of N. Y. labs.

Thatcher Glass Mfg. Co., Inc., Elmira, N. Y. has completed its new container plant at Saugus, Calif.

Deaths

Walter J. Doyle, 51, vice-president of Keogh-Doyle Meat Co. of Denver.—April 15.

James Russel Esty, 58, director of National Canners' Assn. western branch laboratory.—April 29.

Lyle S. Moore, 68, vice-president of Stokley-Van Camp Co. and manager of all southern plants.—April 20.

Russell Stover, 66, confectioner and patentor of method for coating ice cream bars, leading to "invention" of Eskimo Pie.—May 11.

Gaetano Todaro, president and general manager of Coca Cola Co. of Cuba.—April 22.

Garnett H. Hayden, formerly vice-president of Monarch Finer Foods Div., has been named vice-president of Consolidated Foods Corp.

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- FURNISH AND INSTALL ALL NECESSARY REPAIR PARTS, REFR
LIES, including freight and cartage.

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2. Check refrigerant charge, add refrigerant if needed.
3. Check oil in compressors and other equipment, add York Oil if needed.

11. Clean water-cooled condensers once a year.
12. Check and adjust refrigerant controls.
13. Check and adjust safety controls.
14. Check operation of capacity reduction devices.
15. Examine compressors internally if necessary, make any repairs needed.

19. Paint equipment to protect it from deterioration.
20. Make seasonal adjustments and/or start up and shut down equipment per schedule
21. Drain water from all parts of system likely to freeze at end of cooling season.
22. Clean steam traps (air conditioning only).
23. Clean evaporator coils and/or dehumidifiers, check and clean spray nozzles.
24. Check and adjust controls and dampers for correct temperatures and air distribution.
25. Inspect air filters; clean or replace as necessary.

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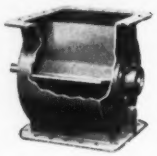

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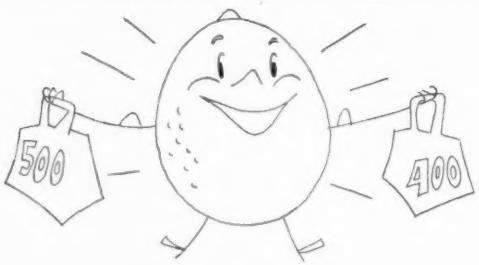

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Food Plant Equipment

Valve Types

Description and illustrations of types of float and lever valves. Catalog 107. 16 p.—*Schade Valve Mfg. Co., 2527-2537 N. Bodine St., Philadelphia 33.*

Circle 253A on Reader Service Card

Uncaser and Washer-Loader

Features of uncaser, case cleaner and washer-loader unit for full depth cases and cartons, with illustrations and diagrams. Form 2J8249. 8 p.—*Radio Corp. of America, Beverage Equipment Section, Camden, N. J.*

Circle 253B on Reader Service Card

Centrifugal Pumps

Series of presentations of stainless steel centrifugal pump models for various specialized uses, with selection and application data. Catalogs 253-D, -I, -N, and -S.—*Tri Clover Machine Co., Kenosha, Wisc.*

Circle 253C on Reader Service Card

Enclosed Motors

Maintenance, performance, and protective features of line of enclosed motors built in 1-30 hp ratings with cutaway drawings. Brochure GEA-6012. 8 p.—*General Electric Co., Schenectady 5, N. Y.*

Circle 253D on Reader Service Card

Thermopilot Valves

Safety pilot shut-off valves which can be installed upstream, specifically designed for small gas-fired appliances. Catalog 50M. 4 p.—*General Controls Co., 801 Allen Ave., Glendale 1, Calif.*

Circle 253E on Reader Service Card

Fluid Power Equipment

Comprehensive line of fluid power pumps, motors, transmissions, cylinders and valves, including variable and constant delivery pumps for high-speed operation. Bulletin 10051-C. 12 p.—*Oilgear Co., W. Pierce St., Milwaukee 4.*

Circle 253F on Reader Service Card

Beer Pumps

Features of several types of pumps for carbonating, transfer, hot wort, and brine. Bulletin 120. 4 p.—*Hasselberg Co., 7703 Roosevelt Rd., Forest Park, Ill.*

Circle 253G on Reader Service Card

Pasteurizing Machine

Characteristics and flow diagram of automatic pasteurizer. Catalog AD 4901. 6 p.—*Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23.*

Circle 253H on Reader Service Card

Instrument Valves

Information on features, applications and specifications of valves for instrument piping and general use, combining unions, nipples, reducers, elbows, tee and valves in one unit. Data Unit 234. 4 p.—*Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.*

Circle 253I on Reader Service Card

Transmitter Unit

Description and illustrations of pneumatic transmitter combined with pressure gage. Bulletin 1025. —*Penn Industrial Instrument Corp., 4110 Haverford Ave., Philadelphia 4.*

Circle 253J on Reader Service Card

Vacuum Filters

Photographic presentation and description of types of continuous vacuum filters and continuous rotary top feed dryers and dewaterer. Bulletin F 2012. 12 p.—*Eimco Corp., 67 Wall St., New York City 5.*

Circle 253K on Reader Service Card

Air-Cooled Condenser

Information on how to completely eliminate water on any size refrigeration or air conditioning system through use of self-contained remote type air-cooled condenser. Manual U-250.—*Kramer Trenton Co., Trenton 5, N. J.*

Circle 253L on Reader Service Card

V-Belts

Features of standard and high capacity constructions with new hp rating tables and cutaway drawings. Bulletin 2170. 8 p.—*B. F. Goodrich Co., Industrial Products Div., Akron, Ohio.*

Circle 253M on Reader Service Card

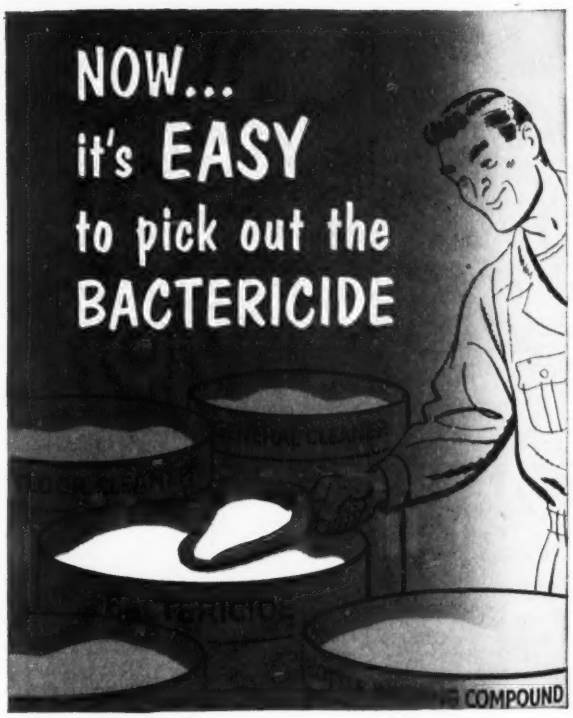
Welding Fittings

Line of corrosion-resistant welding fittings with illustrations and specification tables. Bulletin S-312A. 4 p.—*Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80.*

Circle 253N on Reader Service Card

Centrifugal Separators

Details of operation of centrifugal separator in concentration, washing, clarification, soluble re-



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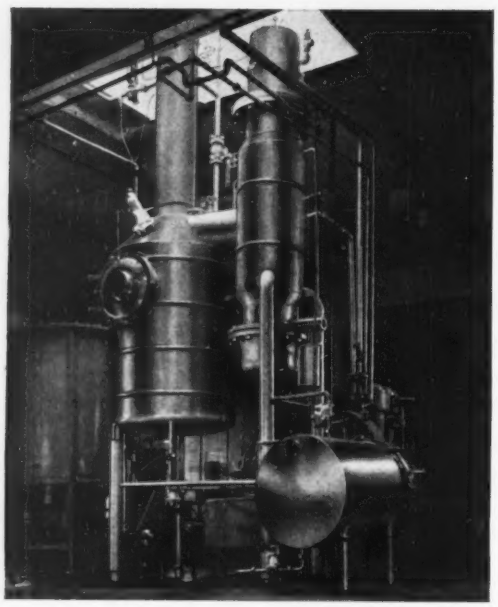

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TESTERS • CULTURE CONTROLLERS • BUTTER PRINT SCALES
PROCESSED CHEESE KETTLES

covery, and classification. Bulletin 5153. 4 p.—*Merco Centrifugal Co., 150 Green St., San Francisco 11.*

Circle 253O on Reader Service Card

Steam Traps

Information on construction of steam trap, including specification tables and data on pressure regulating valves, metering devices, and pipe line strainers. Bulletin 154. 4 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland 2.*

Circle 254A on Reader Service Card

General Purpose Vat

Description and illustrations of stainless steel vat that can be used to heat, cool and mix food products. Bulletin G-495. 4 p.—*Cherry-Burrell Corp., Dept. AS-16, 427 W. Randolph St., Chicago 6.*

Circle 254B on Reader Service Card

Air Cleaner

Description of ceiling-suspended model of electrostatic air cleaner effective even against tobacco smoke particles. 4 p. bulletin.—*Westinghouse Electric Corp., Air Conditioning Div., Dept. T-071, 200 Readville St., Hyde Park, Boston 36.*

Circle 254C on Reader Service Card

Induction Motors

Illustrated description of line of NEMA-frame size induction motors. Bulletin 37-205. 4 p.—*Electric Products Co., 1725 Clarkstone Rd., Cleveland 12.*

Circle 254D on Reader Service Card

Heat Exchanger

Information on operation of heat exchangers used in cooling or controlling temperatures of industrial liquids. Bulletin 120. 4 p.—*Niagara Blower Co., 405 Lexington Ave., New York City 17.*

Circle 254E on Reader Service Card

Feed Press

Design, operation and specification data on strip feed press for high speed production can ends, screw caps and other light stampings. Bulletin 1352. 4 p.—*Baldwin-Lima-Hamilton Corp., Hamilton, Ont.*

Circle 254F on Reader Service Card

Slaughtering Equipment

Information on line of hog slaughtering equipment. Catalog 60-B. 64 p.—*Allbright-Nell Co., 5323 S. Western Blvd., Chicago 9.*

Circle 254G on Reader Service Card

Plant Supplies

Leak Detector

Information on special formula liquid for detecting minute leaks where gas and air is used. Leaflet.—*American Gas & Chemicals, Inc., 45 Rockefeller Plaza, New York City 20.*

Circle 254H on Reader Service Card

Bakery Cleaning

Elaboration of various approved cleaning methods for bakery equipment. Bulletin 1010-B. 17 p.—*Magnus Chemical Co., Inc., Bakery Div., Garwood, N. J.*

Circle 254I on Reader Service Card

Weather Shelters

Description and sketches of loading dock bad weather shelters and canvas wall curtain. Leaflet.—*Atlas Industries, 1300 W. Washington Blvd., Chicago 7.*

Circle 254J on Reader Service Card

Laboratory Chemicals

Listing of lab chemicals, including lot-analyzed reagents, bacteriological culture media, fluid extracts, spirits, tinctures, radioactive reagents, and analytical ion-exchange resins; with information on structural formulas, molecular weights, melting and boiling points and color index numbers for dyes and stains. Catalog 115-C. 304 p.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

Circle 254K on Reader Service Card

Smoke Alarm

Information on single-unit smoke alarm for coal, oil or gas burning installations. Leaflet 110.—*Standard Instrument Corp., 350 Fifth Ave., New York City 1.*

Circle 254L on Reader Service Card

Vacuum Machines

Features and illustrated applications of models of wet and dry vacuum machines with attachments. Forms 215V and WDV-40.—*Hild Floor Machine Co., 740 W. Washington Blvd., Chicago 6.*

Circle 254M on Reader Service Card

Lighting Unit

Description of automatic emergency lighting unit.—*Electric Cord Co., 197 William St., New York City 38.*

Circle 254N on Reader Service Card

Floor Bricks

Detailed description of floor bricks and shapes, joint fillers, drains and floor plates in various industrial and commercial applications, as well as contracting services. Bulletin M2. 4 p.—*Drehmann Paving & Flooring Co., Gaul & Tioga Sts., Philadelphia 34.*

Circle 254O on Reader Service Card

Interior Paints

Illustrations and descriptions of color group finishes for plant interiors and machinery. Form 125. 6 p.—*Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.*

Circle 254P on Reader Service Card

Dairy Cleaner

Discussion of recent developments in products and equipment

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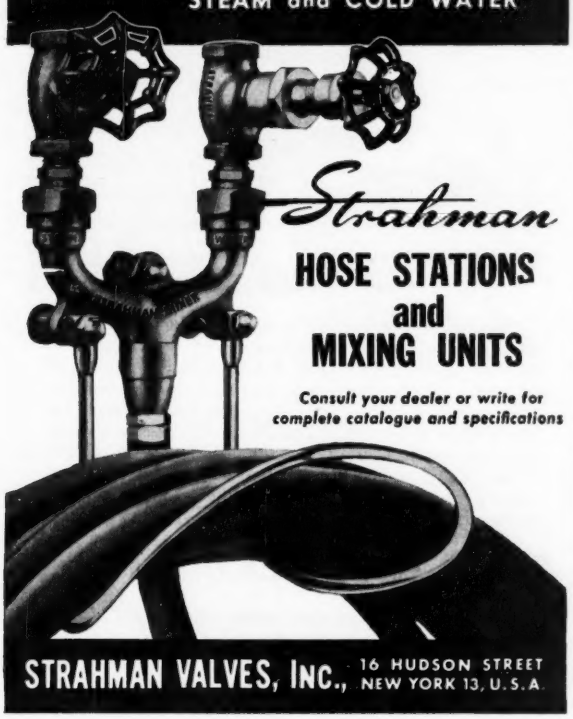

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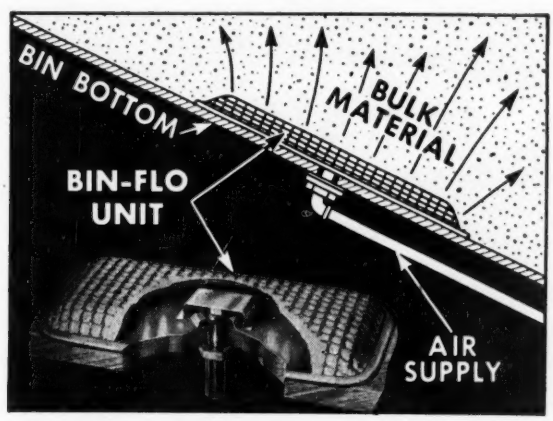

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Ballantine	1906	& 1954
Best Foods	1923	& 1951
Blatz	1910	& 1951
Blue Plate Foods	1917	& 1951
Borden	1918	& 1952
Calvert	1937	& 1952
Canada Dry	1922	& 1954
Carlings	1925	& 1953
Coca-Cola	1918	& 1953
Crosse & Blackwell	1927	& 1951
Finast Foods	1927	& 1951
Four Roses	1929	& 1952
General Foods	1924	& 1951
H. J. Heinz	1909	& 1954
Eli Lilly	1908	& 1951
Mead-Johnson	1921	& 1953
Merck	1922	& 1952
Miller's High Life	1907	& 1954
Monarch Foods	1916	& 1953
National Fruit Prod.	1916	& 1953
Pabst Blue Ribbon	1905	& 1953
Pond's Extract	1909	& 1953
Quaker Maid	1928	& 1954
Rexall	1909	& 1952
Ruppert	1908	& 1953
Schenley	1911	& 1953
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Division of GEO. J. MEYER MANUFACTURING COMPANY
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For Every Purpose
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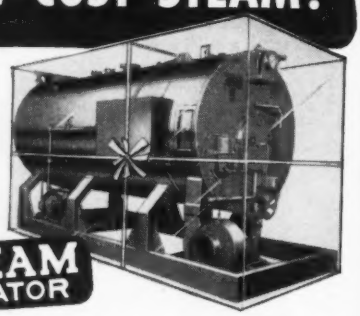

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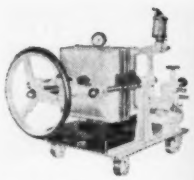

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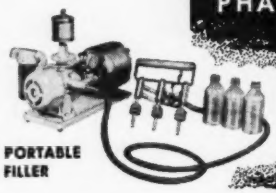

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Two Ertel units that make small production efficient. They have all the desirable features of Ertel high production equipment: EFS-B FILTER has single hand wheel for simple trouble-free operation, bronze or stainless circulatory system, accommodates accepted Ertel Asbestos Filter Sheets. PORTABLE FILLER has automatic overflow system, non-drip spouts, bottle size flexibility up to gallons. And, both units can be easily moved from place to place. Write for detailed information on this important equipment . . . it belongs in your plant.

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You can save time, money and manpower with HYDRO-AIR pressure-cleans tanks, blenders, mixers, cookers, racks, separators, homogenizers, pasteurizing equipment, air filters, dry feeders, bag fillers, trucks and other equipment. Connects to regular air and hot or cold water outlets.

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Composition rubber sleeve is available to protect user's hand when hot water is used.

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Guide for the use of ascorbic acid in meat products, summerizing research work to date. 16 p. booklet.—*Hoffman-La Roche Inc., Roche Park, Nutley, 10, N. J.*

Circle 257A on Reader Service Card

Maintenance Finishes

Information on line of industrial maintenance finishes, including price list. Catalog 53. 48 p. —*Steelcote Mfg. Co., St. Louis.*

Circle 257B on Reader Service Card

Pipe Insulation

Characteristics and applications of lightweight one-piece pipe insulation. Bulletin J 42. 4 p.—*Baldwin-Hill Co., 500 Breunig Ave., Trenton 2, N. J.*

Circle 257C on Reader Service Card

Joint Filler

Colored filling material for dense, tight, non-shrinking joins in brick, tile and glass block. Form AIA-23-Q. 4 p.—*Upco Co., 4805 Lexington Ave., Cleveland 3.*

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Spray Nozzles

Wide variety of spray nozzles with delivery capacities from 1 oz. per hr. to 4000 gals. per min. Bulletin 64. 4 p.—*Spraying Systems Co., 3201 Randolph St., Bellwood, Ill.*

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Petroleum Spray

Method of lubrication for dairy plant and other food plant equipment which eliminates danger of contamination. Leaflet.—*Haynes Mfg. Co., 709 Woodland Ave., Cleveland 15, Ohio.*

Circle 257F on Reader Service Card

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Information on methods and advantages of dry labels in heat seal operations and dry labeling. 12 p. illustrated booklet. — *Nashua Corp., Nashau, N. H.*

Circle 257G on Reader Service Card

Floor Resurfacing

Metallic aggregate to be combined with plastering material for non-shrink resurfacing of concrete floor and bonding of concrete surfaces. Bulletin 541-12315. 8 p.—*A. C. Horn Co., Inc., 10th St. & 44th St., Long Island City 1, N. Y.*

Circle 257H on Reader Service Card

Materials Handling

Woven-Wire Belt

Comprehensive presentation of line of woven metal conveyor belts, extensively illustrated, with diagrams of conveyor arrangements. 64 p. catalog.—*Audubon Wire Cloth Corp., Richmond St. & Castor Ave., Philadelphia.*

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Conveying Equipment

Photos, specifications, and application suggestions on line of portable and permanent-type belt units, gravity wheel and roller conveyors, casters and hand trucks. Catalog GC-53. 16 p.—*Rapids Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich.*

Circle 257J on Reader Service Card

Platform Trucks

Advantages of light-weight, heavy-duty magnesium platform trucks with removable handles. Bulletin MPT-151.—*Mag Line Inc., Pinconning, Mich.*

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Battery Charger

Dimensions, specifications and illustrations of battery charger for use with motorized electric hand trucks. Bulletin P-1333. 4 p.—*Yale & Towne Mfg. Co., Roosevelt Blvd., Philadelphia 15.*

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Lift Trucks

Details on how material handling problems were solved with fork lift truck and load stabilizer. Bulletin JS-133. 4 p.—*Towmotor Corp., 1226 E. 152nd St., Cleveland 10.*

Circle 257M on Reader Service Card

Fiberboard Lifter

Description and illustrated uses of rigid loading fiberboard base for handling of unitized bagged loads with fork trucks. 6 p. foldout bulletin.—*Mead Board Sales, Inc., Lynchburg, Va.*

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Two-Wheel Trucks

Structural details, specifications and two-color photos of over 50 models of two-wheel hand trucks, and platform trucks, including load rating chart. Catalog T-54. 32 p. —*Fairbanks Co., 393 Lafayette St., New York City 3.*

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Power Conveyor

Description of equipment and operation of continuous power conveyor for overhead moving. Bulletin 460. 14 p.—*Richards-Wilcox Co., Aurora, Ill.*

Circle 257P on Reader Service Card

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Details of improved canners conveyor belt with stain resistance, increased elongation and tensile strength. Folder S-5184. 4 p.—*Goodyear Tire & Rubber Co., Akron, Ohio.*

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3. No seats to regrind
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No Food Technologist can tell *in advance* when a batch is going to "go bad."

Is a link missing in your Quality Control Chain?

But he can *be prepared* in advance to spot the trouble *the moment it occurs* by using

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SEND TIME-TEMPERATURE SPECIFICATIONS FOR FREE COOK-CHEX INDICATORS CUSTOM-MADE TO FIT YOUR REQUIREMENTS

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Without obligation, please send me a supply of COOK-CHEX indicator tags designed for use at _____ degrees F., for _____ minutes.

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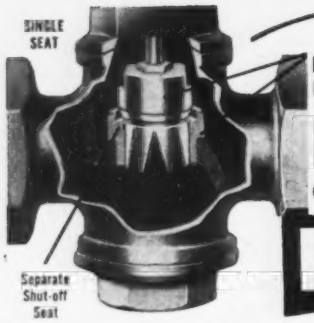
For more information, use coupon on page 181.



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CHARACTERIZED V-PORT

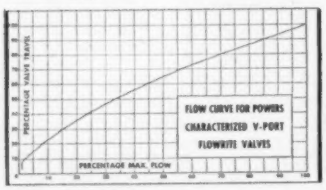
FLOWRITE VALVE

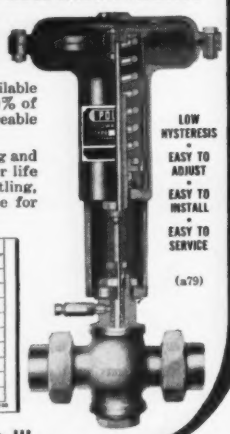
Gives Better Control with Less Maintenance

SPECIAL FLOW CHARACTERISTICS—High lift V-Port plug provides proportional flow throughout entire lift of stem as shown in chart below.

WIDE VARIETY OF SIZES—½" valve available with plugs to give 15%, 30%, 60% or 100% of maximum capacity. Easily interchangeable without removing valve from line.

SUPERIOR DESIGN of stainless steel plug and seat reduces wire drawing, insures longer life and tight shut-off. V-Ports do the throttling, protecting separate shut-off seat. Write for circular (a70).





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(a79)

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To Retain Full Flavor From Plant to Plate, Use Natural Spices

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COOL THAT ROOF!

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RUPPRIGHT'S ROTARY ROOF COOLER

with or without air conditioning

It cools by eliminating solar heat through evaporation of thin film of water continuously renewed on roof.

SIMPLE — INEXPENSIVE

"Makes the Roof Perspire for You"

Write to: Box 6795FE, Los Angeles 22, Calif.

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Pocket-size pH meter and companion probe unit for instant, on-the-spot pH determinations anywhere. Folder.—*Analytical Measurements Inc., 585 Main St., Chatham, N. J.*

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Instruments Catalog

Comprehensive listing of all types of electrical meters, special industrial controls and electrical test equipment with illustrations, charts, diagrams and technical data. Catalog 54. 190 p.—*Electro Tech Equipment Co., 308 Canal St., New York City 13.*

Circle 258B on Reader Service Card

Push Buttons

Line of oil-tight push buttons, indicating lights, selector switches, and accessories. GEA-5779B. 16 p.—*General Electric Co., Schenectady 5, N. Y.*

Circle 258C on Reader Service Card

Recording Viscometers

Design and operation of viscometers for recording-controlling of viscosity in industrial plants. Bulletin V-1000E. 8 p.—*Norcross Corp., Newton 58, Mass.*

Circle 258D on Reader Service Card

Impedance Instrument

Description of high impedance input instrument which can be used with source impedances from 0 to 50,000. Data Sheet 10.0-14. — *Minneapolis-Honeywell Regulator Co., Philadelphia 44.*

Circle 258E on Reader Service Card

Filter Mats

Principles and uses of asbestos filter mats made to specifications. 8 p. brochure.—*T. B. Ford Ltd., Filtration Sales Dept., 101 High Holborn, London, W.C. 1.*

Circle 258F on Reader Service Card

Temperature Regulators

Description, photos and cut-away diagram of temperature regulators with special pilot feature. Form 1008. 4 p.—*Spence Engineering Co., Inc., Walden, N. Y.*

Circle 258G on Reader Service Card

Control Packages

Ten separate systems individually designed for specific furnace, oven, kiln or dryer applications, including all components necessary for complete installation. Bulletin P1260.—*Bristol Co., Waterbury 20, Conn.*

Circle 258H on Reader Service Card

Pressure Transmitters

Operating features and typical installations of transmitter for measuring fluids with positive seal between receiver and fluid. Catalog 4000. 4 p.—*King Engineering Corp., Ann Arbor, Mich.*

Circle 258I on Reader Service Card

Bin Level Indicators

Installation data for line of pressure-actuated bin level indicators for bulk materials, with illustrations. Catalog BD-5A-5M. 20 p.—*Bin-Dicator Co., 13946 Kercheval Ave., Detroit 15.*

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Miscellaneous

Cleaning Operations

Description of various cleaning operations in food processing and packing plants with basic information on silicate detergents. Folder 36-2-7M-152AD. — *Philadelphia Quartz Co., Public Ledger Bldg., Philadelphia 6.*

Circle 258K on Reader Service Card

Alloys Article

Reprint of technical article on cast corrosion resistant alloys most used for process equipment in chemical industries, with tables on properties and recommendations on specific heat and corrosion problems. Bulletin 3 M-1053.—*Cooper Alloy Foundry Co., Hillside, N. J.*

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Milk Handling

Description of various methods by which milk goes to market, considerations in adopting method and benefits of bulk handling. 28 p. booklet.—*Heil Co., 3000 W. Montana St., Milwaukee 1.*

Circle 258M on Reader Service Card

Polyethylene Items

Illustrated listing of laboratory items made of polyethylene. 8 p. catalog—*Schaar & Co., 754 W. Lexington St., Chicago 7.*

Circle 258N on Reader Service Card

Paint Stripping

Detailed instructions on procedures for paint stripping. 13 p. booklet.—*Octagon Process Inc., 15 Bank St., Staten Island 1, N. Y.*

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Specializing in:
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Let them save your time by bringing their broad experience in their specialty to bear on your problems.

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"Searchlight" advertisements are constantly changing. New opportunities are constantly finding their way into this great Want medium, each issue. Regular reading of the "Searchlight" pages can be as important to you as reading the editorial sections; Editorial matter is NEWS OF OPPORTUNITIES offered in the industry.

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QUAKER CITY COLD STORAGE CO., INC.

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3 WAREHOUSE LOCATIONS

Proper Temperature for Frozen Foods

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FOOD ENGINEERING

330 W. 42nd St., New York 36, N. Y.

CARROT OIL makes food golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

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Send NEW ADVERTISEMENTS to New York City Office, 330 W. 42nd St., New York 36, N. Y., for the July issue closing June 24th

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Due to promotions here. One who knows formulas for Baker's Jellies and Bakery Specialties, such as Fudges, Cake Mixes, Flavors, etc.

H. HEXTER & SON
18103 Roseland Road Cleveland 12, Ohio

WE NEED!
FOOD TECHNOLOGISTS and FOOD CANNING CANDIDATES
—junior to top-level.

Call, write or wire:
Gladys Hunting (Consultant)
Employment Counsel, Inc.
7 W. Madison St. Chicago 2, Ill.

REPLIES (Box No.): Address to office nearest you
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CHICAGO: 520 N. Michigan Ave. (11)
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POSITIONS VACANT

FOOD PROCESSOR, exp. every phase making processed cheese. Give full exp., sal. desired. Box 3498, Phila. 22, Pa.

WE ARE looking for an intelligent, alert young man for apackage development and evaluation laboratory operated in connection with the technical sales function of a prominent flexible packaging producer. Some field work is also involved. Please reply, giving education and experience details, and photograph if practical. P-2775, Food Engineering.

LARGE FOOD Plant Service Organization seeks a capable engineer for field work. Drafting experience plus ability to tackle variety of food plant engineering and maintenance problems chief requirements. Engineering degree desirable but not necessary. Excellent opportunity. Submit resume, stating salary desired. Quality Bakers of America, 120 W. 42nd Street, New York 36, New York.

INDUSTRIAL ENGINEER—Cost Control—I.E. degree—2-5 years experience—up to $6,000. Nationally known food processing company. Submit complete resume. P-2925, Food Engineering.

CHEMICAL ENGINEER—Process engineering and product recovery—degree—2-5 years experience—up to $6,500. Nationally known food processing company. Submit complete resume. P-2926, Food Engineering.

SELLING OPPORTUNITIES OFFERED

SALESMEN WANTED calling on Food mfrs. to take on profitable sideline. SW-2933, Food Engineering.

TECHNICAL SALES—Assist Field Sales Representatives by technical aid in food field. Also do new product development work in preserved and canned foods. Salary open. Our people have been informed of this ad. Write Box RW-2723, Food Engineering.

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

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PLANT ENGINEER-P.E. New York; M.E. 10 years broad food industry experience for large food chain including canning, packaging, processing, frozen. Qualified supervise layout, construction, operation, maintenance with progressive organization. For resume write PW-2795, Food Engineering.

FOOD CHEMIST, M.S.—sweetgoods bakery experience. Quality control, raw materials, purchase specifications, formulation, analysis, production standards, package weights, sanitation, taste panel. Plant staff member, liaison sales. Desire responsible, secure position. PW-2915, Food Engineering.

MEAT BUYER—Market manager. Chains, super markets, meat expert, wide experience, relocate, excellent references. PW-2679, Food Engineering.

PRODUCTION MANAGER — 15 years versatile experience very aspect canning, numerous fruit, vegetable products. Seeks greater potential with progressive, quality-minded organization. Absolute authority with complete responsibility a prerequisite. PW-2934, Food Engineering.

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WANTED

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1—MEYER DUMORE—12—WIDE—4 COMPARTMENT BOTTLE WASHER FOR PINT BOTTLES
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1—MEYER DUMORE—12—WIDE 5 COMPARTMENT BOTTLE WASHER FOR QUARTS
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2—1,000 GAL. C E M SATURATORS

All machines can be seen in operation.

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FOR SALE

38" Copper Coating Pans with steam coils
300 gal. Copper Still with condenser and tank
100 qt. 3 speed Read Master Mixer
80 qt. M-80 4-speed Hobart Mixer
100 gal. Copper Steam Jacketed Mixing Kettle
York Freon Compressor with 1½ H.P. 3 phase motor
Burns Split Nut Peanut Blancher

SAVAGE BROS. CO.
2636 Gladys Ave. Chicago 12, Ill.

FOR SALE!

1—Stokes 625 gal. ss vac. pan;
1—Sterling Dicer MD;
1—40" x 72" horizontal retort

Large assortment new ss and monel sanitary valves and fittings — SAVE 50%

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LOCATED IN CHICAGO. REPLY
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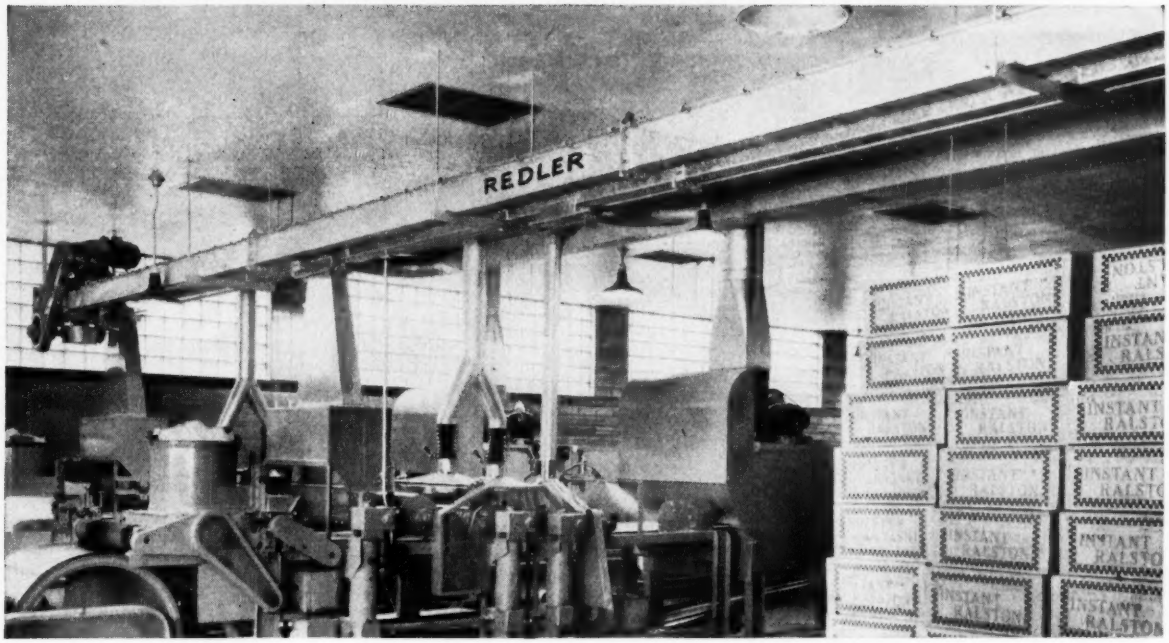


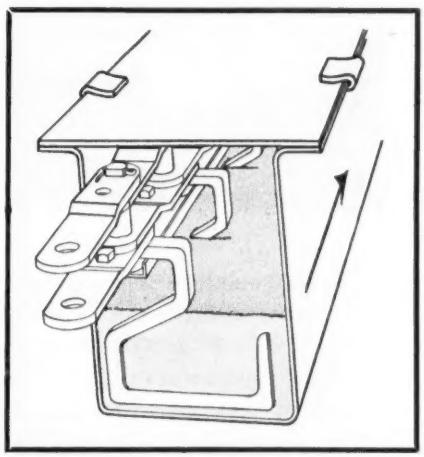
RALSTON-PURINA COMPANY, RY-KRISP PLANT
This coordinated handling system includes three REDLER Loop-Boot Elevators and three REDLER Run-Around Conveyors. Rye flour is picked up from storage and lifted to another floor, then transferred to the Run-Around Conveyors. These 48-foot conveyors discharge selectively to various processing machines through multiple gates. Excess flour continues to circulate and is spouted back to storage for pick-up and recirculation as needed. Each of the REDLER units has a capacity of 300 lbs. per hour, which can be easily increased to 600 lbs. per hour.

Clean, Automatic "Pick-Up and Delivery" for Rye Flour

Immaculate cleanliness in the handling of raw materials—from receiving through final processing—is every-day routine at the Ralston-Purina Company Ry-Krisp plant.

S-A REDLER Conveyors and Elevators that move rye flour in completely sealed conveying systems play a big part in maintaining these standards of purity. Possibility of contamination, leakage and spillage are eliminated. In addition, the REDLERS have helped to reduce costs by continuous integration of handling and processing operations.

Hundreds of other plants are today enjoying similar benefits from REDLER Conveying Systems. *How about you?* REDLERS require little space—can be economically engineered to fit any plant layout with minimum construction. Find out what REDLERS can do to help you. Write for free survey, or mail coupon for our Bulletin No. 140.



Cross section of sidepull REDLER illustrates flow of material in casing below chain track. Unit is self feeding and can recirculate material when it is not taken off at discharge. Material is simply recirculated in conveyor unit until taken off. As REDLER begins to discharge, feed is automatically resumed.

STEPHENS-ADAMSON MFG. CO.
6 Ridgeway Avenue, Aurora, Ill.
Los Angeles, Calif., Belleville, Ontario

Engineering Division	Specialists in the design and manufacture of all types of bulk materials conveying systems.
Standard Products Division	A complete line of conveyor accessories including centrifugal loaders—car puller—bin level controls—etc.
Sealmaster Division	A complete line of industrial ball bearing units available in both standard and special housings.

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Please send me your Bulletin No. 140 on REDLER Conveyors.

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For more information, use coupon on page 181.

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Gives long service . . .

Guards against heat flow . . .

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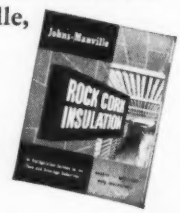
Not just another insulation, *but a many ways better insulation*, Rock Cork has long been the first choice of leading refrigeration engineers.

Rock Cork brings you the excellent insulating qualities of mineral wool, plus the added protection of a moisture-resistant asphaltic binder. Because Rock Cork is basically mineral in composition, it is immune to vermin and mold-growths . . . an extremely important advantage wherever odor-sensitive foods are stored.

Rock Cork is produced in sheet, lagging and pipe insulation forms in standard sizes and thicknesses. Rock Cork Pipe Insulation has the additional protection of an asphalt-saturated asbestos felt jacketing which also speeds installation by reducing the need for seam filling.

Skilled applicators protect your investment! For maximum efficiency, insulation must be installed correctly. Be sure that you get the most out of your insulation dollar by calling in a Johns-Manville insulation contractor. For the name of the one nearest you, write Johns-Manville, Box 60, New York 16, N. Y.



Important insulation facts FREE
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Johns-Manville ROCK CORK®

REFRIGERATION INSULATION

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CHECK THESE MULTIPLE ADVANTAGES OF THE REVOLUTIONARY Dualaire* New DUST COLLECTOR!

No pressure surges!
No filter choking!
Efficiencies up to 99.99%!

Why The DUALAIRE Is Better!

Here's the heart of the DUALAIRE principle. Gas enters through top of filter tube (A). Dust is filtered out along length of filter surface and as it begins to build up (B), the slight change in differential pressure causes the reverse-jet blow ring to go into operation. This ring fits tightly around the filter tube and concentrates a jet of air (C) that blows from the outside *inwardly* through the filter fabric (D).

As the ring moves up and down the tube, the fabric is flexed and blown at the same time, thus loosening the dust *in small portions*. The blow ring travels up and down the filter tube until the filter is clean, then automatically stops until the tube again requires cleaning.

Cleaning action is uniform and steady. There are no sudden pressure surges as filter surface is cleaned — no destructive rapping or jarring operations to shorten life of filter element — no wide variations in gas flow or plant efficiency!

If you use bag-houses or other similar collecting systems in your plant operations, be sure to investigate the *many* vital advantages built into Western Precipitation's new DUALAIRE Dust Collectors. Backed by the same well-known organization that pioneered commercial application of COTTRELL Electrical Precipitators and MULTICLONE Mechanical Collectors, DUALAIRES bring entirely new performance and efficiency standards to filter-type collection systems.

As outlined at the left, heart of the DUALAIRE is a reverse-jet blow ring that travels up and down the cloth filter tube, keeping it clean without the alternate choking and pressure surges characteristic of conventional rapping, vibrating, or jarring systems of cleaning off the collected dust. *Result*—

▸ UNIFORMLY LOW PRESSURE DROP is assured, because the collected dust is removed steadily and in small increments — not by sudden surges!

▸ UNIFORMLY HIGH EFFICIENCIES — as high as 99.99% under actual field conditions — are maintained by the constantly-cleaned filter surfaces. There is no "choking" action — no variation in filter efficiency as dust accumulates!

▸ LONGER FILTER LIFE is obtained because the filter fabric is not subjected to destructive jarring, rapping and vibration of conventional filter cleaning methods. The Dualaire cleaning action is gentle — yet far more effective!

▸ LESS EQUIPMENT IS REQUIRED to handle a given capacity with the Dualaire because no standby sections need be provided for gas cleaning while other sections are shut off for rapping. The Dualaire filter is kept constantly clean — automatically — while it is filtering out the suspensions. The gas is filtered and the dust removed simultaneously — without interruption. Saves space, simplifies installation!

▸ MAXIMUM ADAPTABILITY to varying installation requirements is assured by the "sectionalized" design of the Dualaire. Each section is available in 5 different heights — and as many sections can be bolted together as desired to meet plant requirements. As needs increase, simply add more sections!

▸ EFFICIENT STRAIGHT-THRU DESIGN of filter tubes assures easier dust recovery, better flow. Dirty gas enters top of tube, is filtered through the walls, and dust drops by gravity through bottom of tube into collection chamber. Separated material does not re-entrain in the gas flow.

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